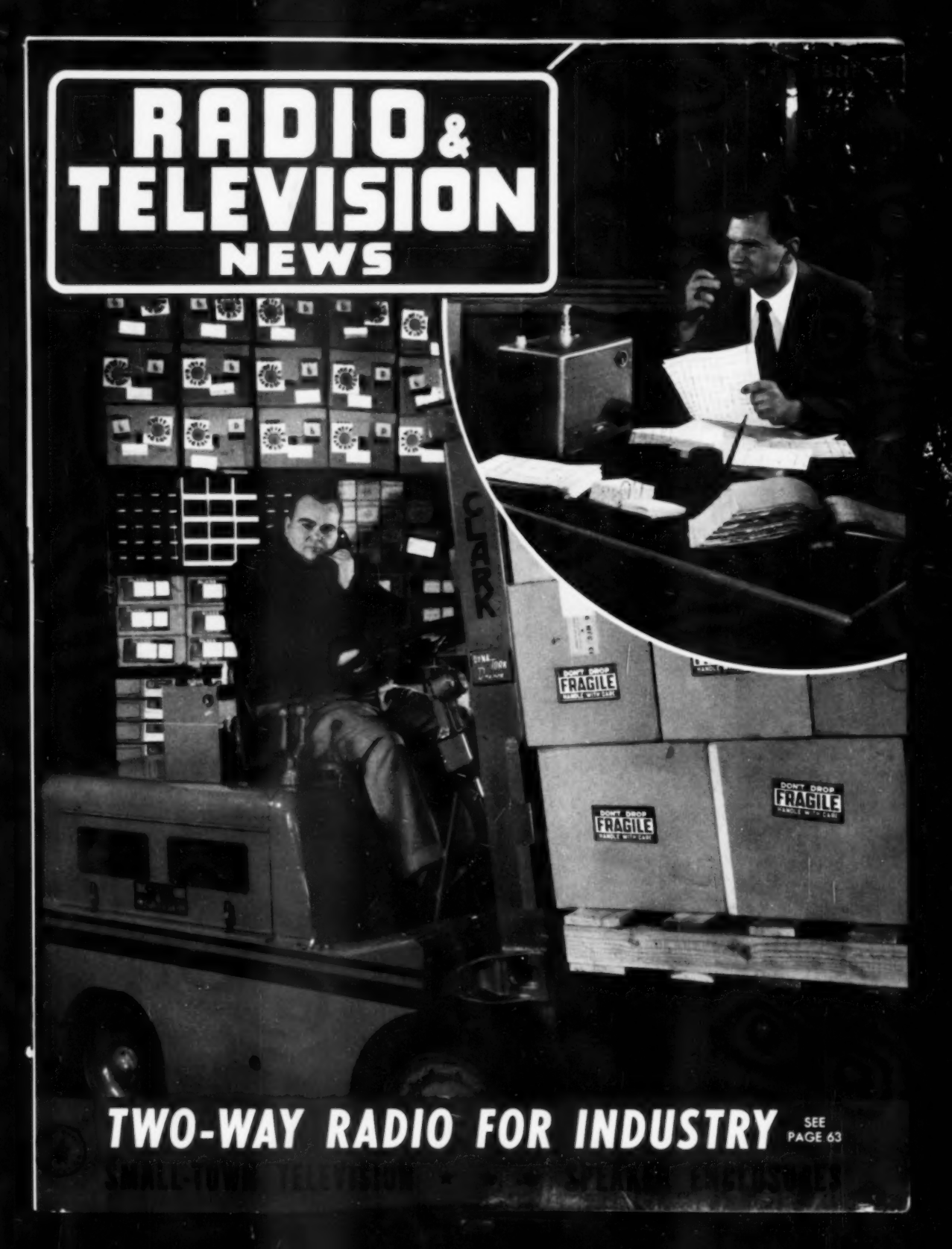
RADIO & TELEVISION NEWS



TWO-WAY RADIO FOR INDUSTRY

SEE PAGE 63

Get out Front

with RCA's new Sales and Servicing aids





ILLUMINATED FLASHING WINDOW DISPLAY



"TELEVISION SERVICE CAMPAIGN KIT"

and watch your business grow!

NEVER BEFORE has RCA made available to you such a varied and colorful assortment of Radio-TV Sales and Servicing Aids to help you build your business—the most comprehensive and useful promotions in the industry. You'll find all the basic business builders . . . from traffic-stopping illuminated "Service" signs and displays to colorful mailing pieces and souvenir gift items, to build your local reputation as "TV-Radio Service Headquarters."

In addition, RCA offers you top-flight technical publications such as the famous "Pict-O-Guides," the "Triple Pindex" with tube base diagrams, "RCA Kinescopes" . . . and the new, authoritative book on "TV Servicing" . . . to make your job easier and more profitable.

For the whole exciting story, ask your RCA Tube Distributor *today* for your free copy of the colorful brochure "In Focus for '52," that describes and illustrates 33 dynamic Sales and Servicing Aids to help you cash in on the fast-growing TV-Radio service business.



EDGE-LIGHTED "LUCITE" CLOCK-SIGN

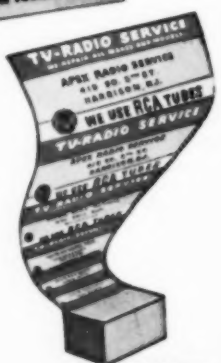


INDOOR ILLUMINATED "FIREGLOW" SIGN





Get this Free Brochure Today from your local RCA Tube Distributor. Read all about RCA's plans to promote your business *right now.*



"REPEAT SERVICE" LABELS

RCA **RADIO CORPORATION of AMERICA**

ELECTRON TUBES HARRISON, N. J.

NEW





I'LL TRAIN YOU FOR YOUR FCC LICENSE

A Federal Communications Commission Commercial Operator's License puts you in line for a good job in Radio or Television Broadcasting, Police, Marine, Aviation, Two-way, Mobile or Micro-wave Relay Radio. Mail coupon below for 64-page book FREE. It will give you complete facts about my NEW Communications course.



YOU BUILD THIS TRANSMITTER

with parts I send. With this Transmitter you practice how to put a station "on the air." You perform procedures demanded of Broadcast Station Operators, conduct many experiments, make many practical tests.

LEARN COMMUNICATIONS by PRACTICING at Home in Spare Time



YOU BUILD this Transmitter Power Supply used in the basic experiments in RF and AF amplifiers, frequency multipliers, buffers, etc.



YOU MEASURE current, voltage (AC, DC and RF), resistance and impedance in circuits with Electronic Multitester you build. Shows how basic transmitter circuits behave; needed to maintain station operation.



YOU PRACTICE setting up code, amplitude and frequency modulation circuits (put voice, music, etc., on "carrier signals" you produce). You learn how to get best performance.



YOU BUILD this Wavemeter and use it to determine frequency of operation, make other tests on transmitter currents.

I Send You Many Kits of Special Equipment



Ever think HOW FAST Radio-Television Communications is changing, developing, growing? Have you considered what this amazing progress can mean to you?

Look at these facts. In 1946 only 6,000 Television sets were sold. In 1950, over 5,000,000. By 1954, 25,000,000 Television sets will be in use, according to estimates. 100 Television Stations are operating in 35 states. Authorities predict there will be over 1,000 Television Stations. This rapid growth means new jobs, more jobs, good pay for qualified men all over the U. S. and Canada. Then add development of FM, Two-way Radio, Police, Marine, Aviation and Micro-wave Relay Radio! Think what all this means! New jobs, more jobs for beginners! Better jobs, better pay for experienced men!

Are you a beginner who wants steady work in this growing field? My NEW course can help you get an FCC License and prepare for the job you want. Are you a man with some training in Radio or Radar, or a Licensed Operator? My NEW course modernizes, increases the value of your knowledge and experience!

MY COURSE INCLUDES TELEVISION

Course Is New! Different!

Mail coupon now for facts about my NEW, intensely practical course in Radio-Television Communications. Let me send you FREE book. Read outlines of 78 lesson texts written by leaders in Communications and edited for you by my practical staff. See the nine big Kits of Parts I send that "bring to life" theory you learn. Read about the Transmitter you build and operate, about the Electronic Multitester you get. All equipment yours to keep. My NEW course covers Theory thoroughly and you get Practical Experience building units like those shown at the left. It's backed by N. R. I.—the world's oldest and largest home study Radio-Television school.

Servicing Training Also Offered by N. R. I.

If you prefer a good-pay job in Radio-Television Servicing . . . or your own money-making Radio-Television Sales and Service Shop, I'll train you at home. My famous Servicing Course also includes many Kits of Radio Parts. You use them to get PRACTICAL EXPERIENCE with circuits common to Radio and Television. I also show you how to make $5, $10 a week or more EXTRA MONEY fixing neighbors' Radios while training. Full information in my 64-page book. Mail coupon.

Mail Coupon For Book FREE

Send today! See what my NEW course is like. Find out how I get you ready for a brighter future, better earnings, more security in Radio-Television. Send coupon now in envelope or paste on a postal. NO OBLIGATION. NO SALESMAN WILL CALL! My book, sent to you FREE, tells the full story. J. E. SMITH, President, Dept. 2FE, National Radio Institute, Washington 9, D. C.



EXTRA PAY IN ARMY, NAVY, AIR FORCE



Knowing Radio, TV, Electronics can help you get extra rank, extra prestige, more interesting duty at pay up to several times a private's base pay. You are also prepared for good Radio-TV jobs upon leaving service. Mail Coupon TODAY.

I TRAINED THESE MEN



"N.R.I. has been my stepping stone from a few hundred to over $4,000 a year as a Radio Engineer."—ALTON B. MICHAELS, Trenton, Georgia.



"I am employed by WKBO as transmitter operator. Have more than doubled salary since starting in Radio full time."—A. HERR, New Cumberland, Penna.



"Am Broadcast Engineer at WLPM. Your NEW Communications course shows the kind of equipment we use."—J. BANGLEY, JR., Suffolk, Virginia.



"4 years ago, I was a bookkeeper with hand-to-mouth salary. Am now Radio Engineer with ABC network."—N. H. WARD, Ridgefield Park, N. J.

MAIL NOW-BOOK FREE

MR. J. E. SMITH, President, Dept. 2FE
National Radio Institute, Washington 9, D. C.

Mail me your 64-page Book about Radio and Television Communications opportunities and training. (No salesman will call. Please write plainly.)

Name _____ Age _____

Address _____

City _____ Zone _____ State _____

Approved Under G. I. Bill



RADIO & TELEVISION NEWS is published monthly by the Ziff-Davis Publishing Company at 185 N. Wabash Ave., Chicago 1, Ill. Entered as second-class matter, July 21, 1948, at the Post Office, Chicago, Ill., under the act of March 3, 1879. Authorized by Post Office Department, Ottawa, Canada, as second-class matter. SUBSCRIPTION RATES: Radio & Television News—one year, U. S. and Possessions, Pan-American countries and Canada $4.00; all other foreign countries $5.00; Radio-Electronic Engineering Edition—one year, U. S. and Possessions, Pan-American countries and Canada $6.00; all other foreign countries $7.00. Postmaster—Please return undelivered copies under form 3579 to 64 E. Lake St., Chicago 1, Ill.

First in radio-television-electronics

Average Paid Circulation over 200,000

RADIO & TELEVISION NEWS

Reg. U.S. Pat. Off.

Radio News Trademark Reg. U. S. Pat. Office ● Television-Radio Trademark Reg. U.S. Pat. Office

CONTENTS — JUNE, 1952

What's Ahead for Small-Town Television?	*Norman Sklarewitz*	31
A 250-Watt TVI-Proof Transmitter	*Robert F. Lewis, W8MQU*	35
Magnetic Tape and the CBC	*Leon A. Wortman*	38
Front End Control Unit for Williamson Amplifier	*Arthur J. Rose*	39
The New G-10 Germanium Dot Rectifier	*T. J. Ferguson*	42
An Improved Resonance Indicator	*Irving Gottlieb*	44
Crystal Diodes in Modern Electronics (Part 8)	*David T. Armstrong*	46
Loudspeaker Enclosures	*David Fidelman*	49
Loudspeaker Enclosure Design Data—Data-Print 2 (Insert)		51
U.H.F. Conversion Methods (Part 1)	*Noel Edwards*	56
Interpreting that TV Pattern (Part 3)	*Ken Kleidon*	59
Mac's Radio Service Shop	*John T. Frye*	62
Two-Way Radio for Industry	*Fritz A. Franke*	63
Factors Influencing High Fidelity	*B. E. Parker*	64
TVI Trouble Ahead		78
Radio-TV Service Industry News		100
Can You Pay Yourself a Salary?	*Harold J. Ashe*	116

DEPARTMENTS

For the Record	*The Editor*	8	What's New in Radio	74
Spot Radio News		16	Reel Review	84
Within the Industry		24	Technical Books	134
Short-Wave	*K. R. Boord*	48	Manufacturers' Literature	136

VOLUME 47 ● NUMBER 6

Member Audit Bureau of Circulations

Editorial and Executive Offices, 366 Madison Ave., New York 17, N. Y.

SUBSCRIPTION SERVICE: All communications concerning subscriptions should be addressed to Circulation Dept., 64 E. Lake St., Chicago 1, Ill. Subscribers should allow at least two weeks for change of address.

CONTRIBUTIONS: Contributors are advised to retain a copy of their manuscripts and illustrations. Contributions should be mailed to the New York Editorial Office and must be accompanied by return postage. Contributions will be handled with reasonable care, but this magazine assumes no responsibility for their safety. Any copy accepted is subject to whatever adaptations and revisions are necessary to meet the requirements of this publication. Payment covers all author's, contributor's and contestant's rights, title, and interest in and to the material accepted and will be made at our current rates upon acceptance. All photos and drawings will be considered as part of the material purchased.

Copyright 1952 by Ziff-Davis Publishing Company. All rights reserved.

Editor
OLIVER READ, D.Sc., D.Litt.

Managing Editor
WM. A. STOCKLIN, B.S.

Technical Editor
H. S. RENNE, M.S.

Midwest Editor
RAY FRANK, W9JU

Associate Editor
HAROLD BECKER

Service Editor
CHARLES TEPFER

Assistant Editor
P. B. HOEFER

Television Consultant
WALTER H. BUCHSBAUM

Short-Wave Editor
KENNETH R. BOORD

Staff Artist
FRANK SAYLES

Advertising Manager
L. L. OSTEN

Midwest Adv. Manager
JOHN A. RONAN, JR.

Western Adv. Manager
JOHN E. PAYNE

Color Art Editor
HERMAN R. BOLLIN



COVER PHOTO: Maximum utility from plant equipment is assured with two-way radio as orders can be given and acknowledged with no possibility of delay or incorrect plant routing. (Ektachrome by Black Box Studios)

Chairman of the Board and Publisher
WILLIAM B. ZIFF

President
B. G. DAVIS

Secretary-Treasurer
G. E. CARNEY

Vice-Presidents
M. H. FROELICH

H. J. MORGANROTH
Production Director

LYNN PHILLIPS, JR.
Advertising Director

H. G. STRONG
Circulation Director

LOUIS ZARA

BRANCH OFFICES
CHICAGO (1)
185 N. Wabash, AN 3-5200
LOS ANGELES (14)
815 S. Hill St., TUcker 9215

"PREPARE NOW, IN SPARE TIME AT HOME TO GET INTO

TELEVISION
RADIO - ELECTRONICS"

says

ART LINKLETTER!





Tells Why "People Are Funny" Program Relies On *D. T. I.* In Program Tie-Ups.

"Most people would be just as amazed as we are if they were privileged to see the remarkable results obtained through DeForest's Training, Inc.'s laboratory and home study training program," declared Art Linkletter, star of one of the nation's most popular radio network shows "People Are Funny."

"There have been many examples through the years," said Linkletter, "but let me cite you one to illustrate my point. One of our winning contestants who won a scholarship to D.T.I.'s Chicago laboratory was a wounded war veteran.

"This young man lost his left arm on the battlefield. Although he had no previous training, and had a hook for a left hand, he was prepared so effectively to be a television technician that after he completed his training he was able to establish his own profitable television and radio service shop. Imagine what this same training could do for the ambitious young man who is not impaired by the same handicap," said Linkletter.

"We must be careful of the quality of the gifts we give on our program. They must be tops. We also must watch the integrity of those who give them. Never once in all of the years that we have done business with DeForest's Training, Inc., have they ever failed to keep their word. Almost on all occasions their gifts far exceeded their obligations."



JACK DEMPSEY Tells Why

FORMER WORLD'S HEAVYWEIGHT CHAMPION

He's Proud To Be With *D. T. I.*

1. I have been greatly impressed with D.T.I.'s wonderful spirit of friendliness and sincere determination to help its students make good in Television-Radio-Electronics.
2. I admire its remarkable 30 year record of helping men build brighter futures.
3. I also admire the business policy of its management and the thoroughness of its large faculty of instructors.
4. Never have I heard young men praise a school as enthusiastically as do the students and graduates of D.T.I. They are its best boosters.

ENJOY YOUR OWN HOME LABORATORY

In addition to modern lessons, you get the PRACTICAL EXPERIENCE YOU NEED from working over 300 electronic experiments at home, including building and keeping all of the electronic equipment shown above. You also get the use of a motion picture projector and 16 reels of visual film to help you learn important points FASTER . . . EASIER at home. And upon completing training, you also have the optional privilege of building and keeping a 17-INCH TV SET at moderate added cost. Send for full facts. Mail coupon today!



MILITARY SERVICE!

If subject to military service, the information we have for you should prove very helpful. Mail coupon today.



"ONE OF AMERICA'S FOREMOST TELEVISION TRAINING CENTERS"

De FOREST'S TRAINING, INC.

AFFILIATED WITH

De VRY *Technical* INSTITUTE

CHICAGO 14, ILLINOIS



ACT NOW! MAIL COUPON TODAY!
Get BOTH of these publications FREE!

DE FOREST'S TRAINING, INC.
2533 N. Ashland Ave., Chicago 14, Ill.

I would like your Opportunity News Bulletin showing "89 Ways to Earn Money in Television-Radio-Electronics"; also, the folder showing how I may prepare to get started in this thrilling field.

Name_____ Age____

Address_____ Apt.____

City_____ Zone____ State____

RN-6-1

The TRIO ROTATOR



Easy to Sell!

It's easy to sell a product with as many plus features to talk about as the TRIO ROTATOR. In design, in construction, appearance; it is by far the outstanding TV antenna rotator in the market today!

Stays Sold!

In addition to providing a powerful sales story, the features listed below are your assurance of complete customer satisfaction: Assurance that the TRIO ROTATOR will give dependable performance year in and year out — in all kinds of weather!

- ✔ Two powerful 24 volt motors used — one for each direction of rotation. Each motor under load only fraction of time — will not burn out!
- ✔ Corrosion resisting, weatherproof housing of die-cast aluminum for greater strength, lighter weight, perfect alignment of parts!
- ✔ Positive electrical stops at ends of 360° rotation prevent damaging or twisting of leads!
- ✔ Will support heavy TV arrays — even in 80 MPH winds!
- ✔ Permanently lubricated with special grease that functions perfectly in high and low temperature extremes!
- ✔ Ball-bearing end thrusts on all shafts, including motor! Main shaft vertical load carried on large oversized "Oilite" self-lubricating bearing!
- ✔ All motors, shafts and gears mounted on a rugged, one-piece casting for true alignment and longer life!
- ✔ 11/16" diameter tool steel main shaft and mast holder will withstand 4500 inch pounds bending moment!
- ✔ Rotator and mast holder fits any pipe size up to 2" OD!
- ✔ Precision built to extremely close tolerances!



Smartly Styled

DIRECTION INDICATOR

The TRIO Direction Indicator is housed in a sturdy plastic cabinet of graceful lines. It is a beautiful instrument that will blend harmoniously with any furniture style.

Utmost ease in selecting the desired antenna direction is provided by a new "finger tip" control that operates at a light touch and the easy-to-read dial face that clearly and instantly indicates the exact antenna position.



FULLY TESTED BEFORE SHIPMENT

Each TRIO ROTATOR is thoroughly factory tested to the equivalent of 3 months of constant operation. This, plus an additional torque test guarantees each unit to be perfect in every detail of assembly.

The TRIO ROTATOR's sound design and construction has been proven by three years of extensive field testing under every extreme of weather.

TRIO Manufacturing Company
GRIGGSVILLE, ILLINOIS

Military Performance and Dependability

THE SX-73 COMMUNICATIONS RECEIVER

"A Gibraltar of Stability"

It is the ultimate in all-wave receivers . . . this jewel of precision craftsmanship! Refined in even the smallest detail, the SX-73 meets the tough military communications specifications. Hallicrafters is proud to place its name on the SX-73.

PRECISION **hallicrafters**

SX-73

Frequency Range:

540 kc to 54 Mc in six turret-selected bands.

20 tubes, including rectifier, voltage regulation and ballast tubes.

Dual conversion, 455 kc and 6 Mc crystal controlled.

Receiver type: Single superheterodyne in tuning ranges of 540 kc to 7.0 Mc and dual conversion on tuning ranges from 7.0 to 54.0 Mc.

Types of signals: AM, CW, MCW, ICW, and Carrier Shift Tele-typewriter.

Frequency calibration: 2 tenths of one per cent or less at all frequencies.

Image rejection: Not less than 80 db at any frequency.

Front panel controls: R.F. gain, AC on/off; b.f.o. pitch; audio gain; crystal phasing; selectivity; V.F.O./Crystal; crystal vernier; band selector; frequency; receiver/send; CW/modulation; A.G.C./manual; A.N.L./off; antenna adjust.



FRONT VIEW, SX-73

HALLICRAFTERS • WORLD'S LEADING MANUFACTURER OF PRECISION RADIO & TELEVISION

CHICAGO 24, ILL.

more than

2,000,000

set owners use jfd

panorama indoor tv antennas



MODEL TA118 DELUXE
6.95 list
MODEL TA136 STANDARD
COMPANION 5.95 list
MODEL TA117 ECONOMY
COMPANION 5.50 list
COMPLETE WITH
TWIN LEAD

triple-chrome plated dipoles
absolutely tip-proof

JFD Electronics

JFD MFG. CO.
BENSENHURST 6-9200 · BROOKLYN 4, N. Y.

For the RECORD

BY THE EDITOR

MANPOWER PROBLEMS—TODAY AND TOMORROW

THE urgent need for technicians in all segments of our vast electronics industry becomes greater with each passing day. The lifting of the TV freeze will place an added burden on a greatly overtaxed service industry. While the initial manpower demands—created by u.h.f. television—will be for design and construction personnel, nevertheless it won't be long until operating personnel will be in great demand for some 2000 new stations.

And, when we consider the servicing requirements for millions of sets in future TV areas, we visualize the great opportunity that exists *TODAY* for thousands of men who are technically-minded to train themselves *NOW* for a future in television.

We've been told by many service contractors that the majority of today's top-flight TV service technicians have taken an accredited course in television theory and practice at one of our many established institutes.

Contrary to general opinion is the fact that a qualified TV service technician need not possess a radio background or experience. Television servicing requires a specialized training in problems not encountered in radio servicing. The reverse is largely true in radio diagnosis.

It took several years to develop efficient service establishments and there remains plenty of room for improvement. The newcomer, as a TV technician or dealer, has the advantage and opportunity to profit by the mistakes that have plagued our industry for many months.

The end-of-freeze is, in fact, the beginning of a slow thaw. New television stations will be the exception rather than the rule for a year or more. Never again, perhaps, will the time be more ripe to lay the foundation for a career in television servicing, engineering, and industrial TV.

Television receivers for v.h.f. continue to be produced in large quantities and will present an additional burden on the service industry in years to come. Here are some recent statistics from RTMA.

A total of 178,571 television sets were produced in 1947. Of this total most were table models representing over 65% of production. Phonograph combinations comprised more than 14% and the remainder were TV consoles. Set production in 1948 increased by nearly 6 times to a total of 975,000 units. Table models (66.31%) continued to lead production followed by consoles (18.38%) and phono combinations (15.31%).

During 1949 consoles became a popular choice. Of a total production of 3,000,000 sets, consoles represented nearly one third of the total output. Table models continued to lead with 60% and phono combinations dropped to 7.2%.

Total 1950 production was 7,463,800 television sets. Of these the production of consoles increased to 3,820,060 or more than 51% of the total output. Table models dropped to about 40% and phono combinations to less than 10% of total 1950 production.

Over 5 million sets were produced last year. The 1951 figures show a slight percentage increase in table models (42.27%) as compared to a steady 51.53% for consoles and a drop for the combinations to 6.20%.

Radio set production figures, as a comparison, reveal a total set output (including home, auto, and portable receivers) in 1947 of 20,000,000 units. Production dropped to 16,500,000 during 1948. Total sets produced in 1949 amounted to but 11,400,000 units—a sizable drop resulting from the impact of TV and other factors.

The year 1950 was a good one for most set makers. More than 14½ million radio sets were produced.

The production of radio receivers continues at sizable figures in spite of the impact of television. Over twelve and a half million radios were produced last year. Since 1946 more than 75 million sets have been added to existing units. All of them, in time, will require maintenance. In radio—as in television—there aren't nearly enough technicians available or in training to do a nationwide maintenance job. There's plenty of room for more—thousands more!

Our recommendations to those looking to a future in television servicing as a profession are:

1. If possible visit an existing TV area and study the operations of well-established service operators.

2. Plan now to take a course in television theory and practice at one of the many excellent technical schools advertised in this publication.

3. If it is impossible to take a resident course—by all means study at home. Many complete and satisfactory "home-study" television courses are available.

4. Study in earnest. Keep informed on all TV developments and techniques through this magazine and other technical journals.

5. Take an active interest in local community affairs while at home. Be seen with your future customers.

By all means, do these things *NOW*!

. . . . . O.R.

BIG VALUES • NEW RELEASES



FREE *SEND FOR IT!*

you'll find them in the latest ALLIED Supplement



"SKY ROVER" PORTABLE KIT

Build this powerful 3-way superhet portable for AC, DC, or battery operation. Covers 535-1650 kc AM broadcast band; has built-in antenna, PM speaker, automatic volume control. Easy to assemble from 8-page illustrated manual. High-quality kit includes all parts, tubes and carrying case (less batteries). Shpg. wt., 6 lbs.

83-276. *Only* **$17.95**
80-596. *Battery Kit* **$2.11**



DEWALD 3-BAND PORTABLE

Powerful broadcast and "round-the-world" Short Wave at low cost! Tunes 540-1600 kc; 2.0-5.45 mc; 5.45-16.7 mc. Operates from AC, DC or batteries. Superhet circuit; loop AM antenna, 53" collapsible SW whip; handsome tan-brown case, 9½ x 11½ x 5¼". Complete with tubes, less batteries. 9 lbs.

42-708. *Only* **$42.50**
80-619. *Battery Kit* **$4.74**



WELLER SOLDERING IRON

Squeeze the trigger—you're ready to solder in 5 seconds! Double-tube electrode and long tip; with 2 spotlights that light up working area. Air-cooled transformer. 100-135 watt dual-heat type. Shpg. wt., 3 lbs.

46-589. *Only* **$10.73**



CHAMPION SPRAY GUN

Smooth-working all-metal electric gun for spraying lacquer, paint, varnish, chemicals, insecticides, etc. No compressor—has motor right in handle—develops over 90 lb. pressure. Pistol trigger. 25-ounce glass jar. With 8 ft. cord. For 110-120 v., 60 cy. AC. Shpg. wt., 5 lbs.

46-139. *Only* **$9.57**



MICRO-VOX WIRELESS MICROPHONE

Mike with built-in midget radio transmitter plays through any radio within 50 feet for home entertainment or as small P.A. System. Complete with built-in batteries. Shpg. wt., 3 lbs.

99-485. *Only* **$5.85**



E-Z-I TV LIGHT AND CLOCK

Combination TV light and numeral-type clock. When placed on top of TV cabinet, helps reduce viewing eyestrain. Walnut plastic case, 5 x 5½ x 7½". For 110 v., 60 cy. AC. Shpg. wt., 2½ lbs.

78-328. *Only* **$7.66**



WHEELER SELF-POWERED PHONE

Self-contained, self-powered telephone handset—no batteries or line voltage needed. Fine for inter-room use. Use with No. 16 or No. 19 twisted wire. With 3½ ft. cable, test clips, insulators. Shpg. wt., 1½ lbs.

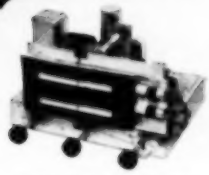
59-350. *Only* **$9.62**



4 X 6" OVAL SPEAKER VALUE

Ideal for replacement use in portable and table radios, TV sets and intercom. Fine buy for builders, experimenters. With 1.47 oz. Alnico V magnet. Voice coil imp. 3.2 ohms. Wt., 12 oz.

81-640. *Only* **$1.69**



PILOT HI-FI AM-FM TUNER

Best buy in a quality tuner covering standard AM broadcast and 88-108 mc FM. Flat response within 2 db, 20-15,000 cps. Slide-rule dial; separate 3-gang condensers for AM and FM; input for phono and TV, with bandswitch; power supply; tuned RF on AM and FM; ceramic loop stick antenna for AM, FM line antenna. Size, 11½ x 6 x 9"; with 9 tubes and rect. For 110-120 v., 50-60 cy. AC. Shpg. wt., 8½ lbs.

97-944. *Only* **$42.95**



KNIGHT 3-SPEED PHONO-RADIO

Complete home entertainment at new low cost. Has V-M 3-speed intermix changer, with turnover cartridge—plays *all* records, all sizes and speeds—intermixes 10" and 12" records. Superhet radio covers 540-1730 kc; Alnico PM speaker, tone control. In attractive cabinet, 15 x 9½ x 19¼". With all tubes and loop antenna. For 105-125 v., 60 cy. AC. Shpg. wt., 35 lbs.

50-563. *Only* **$56.75**

PLASTIC SPRAY

Provides tough coating of clear flexible plastic on any surface. Guards against rust, tarnish, etching. Dries hard in an hour. Automatic spray. Shpg. wt., 1¼ lbs.

43-136. *Only* **$1.03**



NEW REGENCY TV BOOSTER

Features maximum stability on all TV channels by providing inductive and capacitive neutralization. Single tuning knob for easy operation. Fine tracking accuracy. Improves both picture and sound for greater TV enjoyment. Mahogany plastic cabinet, 4½ x 6 x 4½". For 110-120 v., 60 cy. AC. Shpg. wt., 7 lbs.

97-211. *Only* **$19.11**



NEW TV TUBE BRITENER

Extends useful life of older, dull-looking TV picture tubes; increases electron emission, thus adding brightness. Installs inside cabinet in minutes; automatic; 3 boost positions to select desired tube brilliance.

80-179. *Only* **$5.73**



NEW TV CLARIFIER

Tunes out antenna-fed interference which causes annoying TV picture distortion. Eliminates FM, diathermy, SW, ignition, amateur interference, etc. Matches any antenna. Easy to install and operate. Brown case, 4 x 3¼ x 1½". Shpg. wt., ½ lb.

77-566. *Only* **$4.41**



NEW "TENNA-BOAT" TV INDOOR ANTENNA

Beautiful, practical. Ceramic boat hull is base; mast and boom are the antenna. Plastic sail is rotatable for best reception; has built-in tuning condenser.

97-047. Dark Green
97-048. Crimson
97-049. Harvest Moon
} *Each, Only* **$8.25**

All Prices F. O. B. Chicago

ALLIED RADIO

ALLIED RADIO CORP. Dept. 1-F-2
833 W. Jackson Blvd., Chicago 7, Ill.

FREE SEND FOR IT

☐ Send Free ALLIED Supplement No. 130.

☐ Enter order for .....

..... $ ..... enclosed

Name .....

Address .....

City ..... *Zone* ..... *State* .....

LOOK AT THE BOX



Look at the figures in the charts below. *These figures are taken from current catalogs listing stock distributor items.* Compare Centralab's complete line of temperature compensating capacitors with the four other leading makes. You'll see why more service engineers are standardizing on Centralab wherever capacitors of this type are required.

Remember too — Centralab was the first manufacturer to offer temperature compensating ceramic capacitors to the market.

For r.f. and resonant circuits — where frequency drift is critical — Centralab Temperature Compensating Capacitors are the last word in accurate stabilizing — *safest and best for guaranteed servicing.*

TCZ's SHOW NO CAPACITANCE CHANGE OVER WIDE RANGE OF TEMPERATURE (-20°C to +85°C)

CRL				COMPETITOR A**			COMPETITOR B**			COMPETITOR C**			COMPETITOR D**		
600VDCW	1200VDCT			(tubular) 500 VDCW			Disc. 500 VDCW — 1000 VDCT			(tubular)			(tubular) 300 WVDC		
										Voltage 500 VDCW					
CRL Part No	Cap. mmf.	Tolerance	Net Price	Cap. mmf.	Tolerance	Net Price	Cap. mmf.	Tolerance	Net Price	Cap. mmf.	Tolerance	Net Price	Cap. mmf.	Tolerance	Net Price
TCZ- .5	0.5	± .25 mmf	.45	*			†			†			†		
TCZ- .68	0.68	± .25 mmf	.45	*			†			.75	± .1 mmf	.45	†		
TCZ- 1.0	1.0	± .25 mmf	.45	*			†			†			†		
TCZ- 1.5	1.5	± .25 mmf	.45	1.0	± 1 mmf	.30	†			1.5	± .5 mmf	.30	1.5	‡	.30
TCZ- 2.2	2.2	± .25 mmf	.45	*			†			†			†		
TCZ- 3.3	3.3	± .25 mmf	.45	3.0 3.3	± 1 mmf	.30	†			3.0 3.3	± 1 mmf ± .5 mmf	.30 .30	3.0 3.3	‡ ‡	.30 .30
TCZ- 4.7	4.7	± .5 mmf	.36	4.7	± 1 mmf	.30	†			4.7 5.0	± .5 mmf ± 1 mmf	.30 .30	4.7 5.0	‡ ‡	.30 .30
TCZ- 6.8	6.8	± .5 mmf	.36	5.0 6.8	± 1 mmf	.30	†			6.8	± .68 mmf	.30	6.8	‡	.30
TCZ- 10	10	± .5 mmf	.36	8.2 10	± 1 mmf	.30	10	‡	.30	10	± 1 mmf	.30	8.2 10	‡ ‡	.30 .30
TCZ- 12	12	± .5 mmf	.36	*			†			†			†		
TCZ- 15	15	± .5 mmf	.36	*			15	‡	.30	†			†		
TCZ- 18	18	± .5 mmf	.36	*			†			†			†		
TCZ- 20	20	± .5 mmf	.36	20	± 10%	.30	†			20	± 10%	.30	20	‡	.30
TCZ- 22.0	22	± 2½%	.30	*			22	‡	.30	†			†		
TCZ- 24	24	± 2½%	.30	25	± 10%	.30	25	‡	.30	25	± 10%	.30	25	‡	.30
TCZ- 27	27	± 2½%	.30	*			†			†			†		
TCZ- 30	30	± 2½%	.30	*			†			†			†		
TCZ- 33	33	± 2½%	.30	33	± 10%	.30	33	‡	.30	33	± 10%	.30	33	‡	.30
TCZ- 36	36	± 2½%	.30	*			†			†			†		
TCZ- 39	39	± 2½%	.30	*			†			†			†		
TCZ- 43	43	± 2½%	.30	*			†			†			†		
TCZ- 47	47	± 2½%	.30	*			47	‡	.33	†			†		
TCZ- 51	51	± 2½%	.30	50	± 10%	.33	†			50	± 10%	.33	50	‡	.33
TCZ- 56	56	± 2½%	.30	*			†			†			†		
TCZ- 62	62	± 2½%	.30	*			†			†			†		
TCZ- 68	68	± 2½%	.30	*			68	‡	.33	†			†		
TCZ- 75	75	± 2½%	.30	75	± 10%	.33	†			75	± 10%	.33	75	‡	.33
TCZ- 82	82	± 2½%	.30	*			†			†			†		
TCZ- 91	91	± 2½%	.30	*			†			†			†		
TCZ-100	100	± 2½%	.30	100	± 10%	.33	100	‡	.33	100	± 10%	.33	100	‡	.33
TCZ-110	110	± 5%	.30	*			†			†			†		
TCZ-120	120	± 5%	.30	*			†			†			†		
TCZ-130	130	± 5%	.30	*			†			†			†		
TCZ-150	150	± 5%	.30	150	± 10%	.36	150	‡	.36	150	± 15 mmf	.36	150	‡	.36
TCZ-160	160	± 5%	.30	*			†			†			†		
TCZ-180	180	± 5%	.30	175	± 10%	.36	†			175	± 17.5 mmf	.36	175	‡	.36
TCZ-200	200	± 5%	.30	*			†			†			†		
TCZ-220	220	± 5%	.30	*			†			†			†		
TCZ-240	240	± 5%	.30	*			†			†			†		
TCZ-270	270	± 5%	.30	*			†			†			†		
TCZ-300	300	± 5%	.30	*			†			†			†		

**Name on request. *Not catalogued item — available on special order. †Not catalogued ‡Tolerance not listed in literature

SCORE! ... Of the five leading makes of temperature compensating capacitors — Centralab gives you more values to choose from — closer tolerances you can rely on — at prices that are right!

TCN's VARY CAPACITANCE ACCORDING TO TEMPERATURE

CRL				COMPETITOR A** (tubular)			COMPETITOR B** (disc)			COMPETITOR C** (tubular)			COMPETITOR D**		
CRL Cat. No.	Cap. mmf.	Tolerance	Net Price	Cap. mmf.	Tolerance	Net Price	Cap. mmf.	Tolerance	Net Price	Cap. mmf.	Tolerance	Net Price	Cap. mmf.	Tolerance	Net Price
TCN- 3	3	± .5 mmf	.36	*			†			†			†		
TCN- 5	5	± .5 mmf	.36	5	± 10% or ± 1 mmf	.30	†			5	± 10% or ± 1 mmf	.30	5	‡	.30
TCN- 10	10	± .5 mmf	.36	10	± 10% or ± 1 mmf	.30	10	‡	.30	10	± 10% or ± 1 mmf	.30	10	‡	.30
TCN- 12	12	± .5 mmf	.36	*			†			†			†		
TCN- 15	15	± .5 mmf	.36	*			15	‡	.30	†			†		
TCN- 18	18	± .5 mmf	.36	*			†			†			†		
TCN- 20	20	± .5 mmf	.36	*			†			†			†		
TCN- 22	22	± 2½%	.30	*			22	‡	.30	†			†		
TCN- 24	24	± 2½%	.30	*			25	‡	.30	†			†		
TCN- 27	27	± 2½%	.30	*			†			†			†		
TCN- 30	30	± 2½%	.30	*			†			†			†		
TCN- 33	33	± 2½%	.30	*			33	‡	.30	†			†		
TCN- 36	36	± 2½%	.30	*			†			†			†		
TCN- 39	39	± 2½%	.30	*			†			†			†		
TCN- 43	43	± 2½%	.30	*			†			†			†		
TCN- 47	47	± 2½%	.30	47	± 10%	.30	47	‡	.30	47	± 10%	.30	47	‡	.30
TCN- 51	51	± 2½%	.30	*			†			†			†		
TCN- 56	56	± 2½%	.30	*			†			†			†		
TCN- 62	62	± 2½%	.30	*			†			†			†		
TCN- 68	68	± 2½%	.30	*			68	‡	.30	†			†		
TCN- 75	75	± 2½%	.30	75	± 10%	.30	†			75	± 10%	.30	75	‡	.30
TCN- 82	82	± 2½%	.30	*			†			†			†		
TCN- 91	91	± 2½%	.30	*			†			†			†		
TCN-100	100	± 2½%	.30	100	± 10%	.30	100	‡	.30	100	± 10%	.30	100	‡	.30
TCN-110	110	± 5%	.30	†			†			†			†		
TCN-120	120	± 5%	.30	†			†			†			†		
TCN-130	130	± 5%	.30	†			†								
TCN-150	150	± 5%	.30	†			150	‡	.30						
TCN-160	160	± 5%	.30	†			†								
TCN-180	180	± 5%	.30	†			†								
TCN-200	200	± 5%	.30	†			200	‡	.30						
TCN-220	220	± 5%	.30	†			220	‡	.30						
TCN-240	240	± 5%	.30	†			†								
TCN-270	270	± 5%	.30	†			†								
TCN-300	300	± 5%	.30	†			†								
TCN-330	330	± 5%	.30	†			330	‡	.30						
TCN-360	360	± 5%	.30	†			†								
TCN-390	390	± 5%	.30	†			†								
TCN-430	430	± 5%	.30	†			†								
TCN-470	470	± 5%	.30	†			†								
TCN-510	510	± 5%	.30	†			†								
TCN-560	560	± 5%	.30	†			†								
TCN-620	620	± 5%	.30	†			†								
TCN-680	680	± 5%	.30	†			†								
TCN-750	750	± 5%	.30	†			†			†			†		

**Name on request.

Centralab Temperature Compensating Capacitors are available in five body sizes, *with most values in the smaller dimensions.* For more information, see your Centralab Distributor.

Centralab

A Division of Globe-Union Inc.
910 East Keefe Avenue • Milwaukee 1, Wis.

THE TV FREEZE IS OFF

AIREX RADIO CORP.

AND HERE IS THE PERFECT CHASSIS FOR FRINGE AREA, UHF AND VHF RECEPTION . . .

NOW . . . . YOU CAN RECEIVE THE NEW UHF* CHANNELS

ON OUR SUPER DX "630" TV CHASSIS

WITHOUT USING EXPENSIVE OUTSIDE CONVERTERS

NEW 21 MC HAM BAND WILL NOT INTERFERE WITH OUR SET

This wonderful new 30 tube Super "630" DX handles all tubes from 10" to 24" . . . brings in better reception up to 200 miles without use of boosters. It will work where other sets have failed. Down to 4 microvolt sensitivity. The NEW STANDARD COIL CASCODE TUNER gives you greater sensitivity with less snow,* and is easily adapted to UHF in 2 minutes by merely changing the channel slug (no tools necessary) when a UHF station is installed in your area. Tuner is fully shielded against outside radiation. 6CB6 tubes in video IF, plasticized condensers, synchro lock, Armstrong FM sound system, keyed AGC, set aligned for 21.75 MC. Factory wired, aligned and tested before shipment. Phono and color connections on chassis. All parts and tubes fully guaranteed 3 months.

$149.95
Complete with 12" RCA Hi-Fi Speaker. Fed. Tax Included. Less Picture Tube



Tube Mtg. Brackets $6.50

RMA GUAR.

Mfr. Lic. by RCA

COMPLETE SERVICE MANUAL FOR ABOVE SET, $1.00!

SENSATIONAL SPECIAL OFFER OF THE AIREX SUPER DX COMPLETE TV SETS . . . THE FINEST SET VALUE IN ITS PRICE CLASS

These outstanding sets were specially designed to meet our rigid specifications to assure you many pleasant hours of trouble free TV at an unequalled price. The mfr. is licensed by RCA. RMA guarantee. All you have to do is plug in and play.



17"—$154.95
20"—$179.95

AIR KING 6-TUBE CHASSIS

Superhet. AC-DC for custom installation. Complete with loop antenna, all tubes and extra RF stage. Ready to play. Reg. $19.95.

MATCHING PLASTIC CABINET $3.95

$11.95



17"—$174.95
20"—$199.95

Check These Features

- Has standard coil Cascode tuner that brings in reception up to 200 miles
- 20 tubes
- Large Hi-Fi speaker
- Hand rubbed, satin finished genuine mahogany cabinet
- AGC
- Moulded plastic condensers
- Black, glareless picture tube, guaranteed for 6 months
- Adaptable for UHF and color
- Synchronized FM audio system
- 5 hour heat run at factory
- Factory wired, aligned and tested
- Mounted in cabinet.

Price Smashing Values in TV Cabinets for "630" Chassis

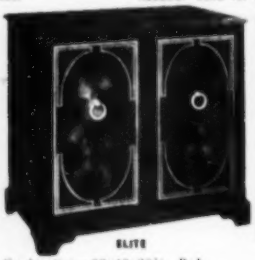
Beautiful, richly finished, hand rubbed mahogany cabinets to suit every taste. They are designed to house the "630" chassis, 12" speaker and up to 20" TV tube. The combination cabinets will hold up to a 20" TV tube, radio and Webster record changer, with ample record space.

All cabinets are equipped with mask and mounting brackets. The perfect chassis deserves a perfect cabinet. It will be a focal point of beauty in your home. Other models in stock. When ordering chassis and cabinet, no tube mounting brackets needed. Send for FREE circular on cabinets only.



ECONOMY

38x22½x22½—16" and 17" tube $49.95
41x25x23—16" to 20" 59.95
45x28x25—24" tube 74.95
Blonde $10 Additional



ELITE

Combination—38x40x23½. Red antique gen. leather. Gold leaf hand tooling $149.95
In limed oak, gold colored leather 159.95



STRATFORD

40x28½x23½. Genuine scotch Mahogany doors for 20" only . . . $89.95

All merchandise is brand new, factory fresh & fully guaranteed. Mail & phone orders filled upon receipt of certified check or money order for $25 as deposit on TV chassis, 20% on other items. Balance C.O.D., F.O.B. N. Y. Prices subject to change without notice. No Fed. taxes to pay. Prices lower than Of'S Regs.

AIREX RADIO CORP. 171 Washington St., N.Y.C. 7, N.Y. Phone WOrth 2-4029

TV TUBE EXTRA

STANDARD BRANDS
BLACK-GLARELESS

Factory New—1st Quality
Guaranteed 1 Year

7JP4*	$14.95	17BP4	$27.95
10BP4*	17.95	20" TV Tube	34.95
16GP4*	24.95	21" TV Tube	39.95
16JP4*	24.95	24" TV Tube	69.95

Ring and Sleeve for 24" Tube . $7.50
*Guaranteed for 6 months only

TV GOLD PLASTIC MASKS
16" & 17", $4.95; 20" & 21", $7.95; 24", $14.95

TV ANTENNA BARGAINS

Following antennas can be used with our sets and are perfect for fringe area use.

Single Conical	$ 3.95	5 Ft. Sect. Enam. Steel Mast	$1.00
Double Conical With Stacking Bars	8.95	Wall Brackets	.98
Single Vee	4.95	Chimney Mt. Brackets	1.75
Double Vee With Stacking Bars	10.95	Lightning Arrester	.75
		Mast Insul., ea.	.10
		Wall Insul., ea.	.07

AIR KING PORTABLE PHONO & RADIO

6 Tube AM radio, with extra RF stage. 3 speed, turnover cartridge, record player. Complete in simulated alligator leather carrying case. Regularly $100.

$59.95

AUTOMATIC RECORD CHANGER SALE!

01—3 speed Turnover Cart. **$18.95**

RCA VICTOR 3IU-1 & 7S 45RB Intermix over Cart. **$22.95**

RCA ACCORDION CONE SPEAKER

6" Diam. 21 oz. magnet. 3.2 VC. Regularly $22. Removed from original RCA equipment . . **$4.95**

RESISTOR KIT

100 Assorted ½ to 2 Watt **$2.49**

1000 lots **$22.00**

REAL BUY! 300 OHM TV LEAD IN WIRE

14 strands each leg. Heavy duty.
100 ft. . . . . $1.89; 1000 ft. . . . $17.95

"NOW YOU CAN FIX YOUR OWN TV SET" Simplified book. Fix over 1,000 models listed by 39 manufacturers **$1.00**

SPECIAL BARGAINS

- **Espey 7C FM-AM Radio, 12 Tubes . . $69.95**
- **RCA Hi-fi speaker 4.95**
- **Standard Coil Cascode Tuner 24.95**
- **Quam-Nichols 4x6 Dual 2.79**
- **Regency Booster, Mdl DB410 . . . . . 19.11**

COMPLETE LINE 630 PARTS
RADIO TUBES 50% TO 70% OFF LIST

SEND POSTCARD TO BE PUT ON FREE MAILING LIST

Learn RADIO TELEVISION

–New Package Unit Plan– PAY AS YOU LEARN

NO MONTHLY PAYMENT CONTRACT TO SIGN!



I Send You 18 BIG KITS OF RADIO-TELEVISION EQUIPMENT



Approved for Veterans Under the G.I. Bill



TRAIN IN 10 MONTHS OR LESS

At Home in Your Spare Time

Now . . . be ready for Radio-Television's big pay opportunities in a few short MONTHS! Frank L. Sprayberry's completely new "Package" training unit plan prepares you in just 10 MONTHS . . . or even less! Equally important, there is NO monthly payment contract to sign . . . thus NO RISK to you! This is America's finest, most complete, practical training—gets you ready to handle any practical job in the booming Radio-Television industry. In just 10 months you may start your own profitable Radio-Television shop . . . or accept a good paying job in this fascinating expanding field at work you've always wanted to do. Mr. Sprayberry has trained hundreds of successful Radio-Television technicians—and stands ready to train you in less than one year, even if you have no previous experience. You learn by DOING . . . actually working with your hands with equipment of special design to illustrate basic theory instead of relying on books alone.

VALUABLE EQUIPMENT INCLUDED WITH TRAINING

The new Sprayberry "package" plan includes many big kits of genuine, professional Radio-Television equipment. While training you actually perform over 300 demonstrations, experiments and construction projects. In addition, you build a powerful 6-tube standard and short wave radio set, a multi-range test meter, a signal generator, signal tracer, many other projects. All equipment is *yours to keep* . . . you have practically everything you need to set up your own service shop. The interesting Sprayberry book-bound lessons and other training materials . . . all are yours to keep.

EARN EXTRA MONEY WHILE YOU LEARN!

All your 10 months of training is AT YOUR HOME in spare hours. Keep on with your present job and income while learning . . . and earn EXTRA CASH in addition. With each training "package" unit, you receive extra plans and ideas for spare time Radio-Television jobs. Many students pay for their entire training this way. You get priceless practical experience and earn generous service fees from grateful customers. Just one more reason why the Sprayberry new 10 MONTH-OR-LESS training plan is the best Radio-Television training in America today. If you expect to be in the armed forces later, there is no better preparation than good Radio-Television training.

FREE 3 BIG RADIO TELEVISION BOOKS



I want you to have ALL the facts about my new 10-MONTH Radio-Television Training—without cost! Act now! Rush the coupon for my three big Radio-Television books: "How to Make Money in Radio-Television," PLUS my new illustrated Television Bulletin PLUS an actual sample Sprayberry Lesson—all FREE with my compliments. No obligation and no salesman will call on you. Send the coupon in an envelope or paste on back of post card. I will rush all three books at once!

SPRAYBERRY ACADEMY OF RADIO
Dept. 25-K, 111 North Canal St., Chicago 6, Ill.

Mail Coupon Today!

NO OBLIGATION
No Salesman Will Call

SPRAYBERRY ACADEMY OF RADIO, Dept. 25-K
111 North Canal St., Chicago 6, Ill.

Please rush to me all information on your 10-MONTH Radio-Television Training Plan. I understand this does not obligate me and that no salesman will call upon me.

Name.....Age.....

Address.....

City.....Zone.....State.....

Please check Below About Your Experience

☐ Are You Experienced? ☐ No Experience

IF YOU ARE EXPERIENCED IN RADIO

Men already in Radio who seek a short intensive 100% TELEVISION Training with FULL EQUIPMENT INCLUDED are invited to check and mail the coupon at the right.



Have a Look at some of the

World's Finest Radio Parts!



Ordinary radio parts? Not at all! You see, these automobile radio parts—like thousands of others bearing the Delco Radio name—are of uniform high quality.

More than half **of all** radio-equipped cars are equipped with Delco Radios—*seven million* in all. Think of the volume-building opportunity for you!

THINGS TO REMEMBER ABOUT DELCO RADIO SERVICE PARTS

1. Offer largest market for original-equipment replacement parts.
2. Made in the world's largest factory devoted exclusively to automobile radios.
3. Designed by one of the largest and most forward-looking engineering groups devoted exclusively to automotive radio.

DELCO RADIO PARTS

A GENERAL MOTORS PRODUCT — **A UNITED MOTORS LINE**

DISTRIBUTED BY WHOLESALERS EVERYWHERE

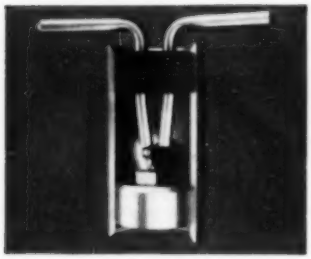
DELCO RADIO

DIVISION OF GENERAL MOTORS CORPORATION

KOKOMO, INDIANA

THE TRANSISTOR

A picture report of progress



FIRST TRANSISTORS were of this point contact type (picture three times life size). Current is amplified as it flows between wires through a wafer of germanium metal. These transistors are now being made at the Allentown plant of Western Electric, manufacturing unit of the Bell System. They will be used in a new selector which finds the best routes for calls in Long Distance dialing.



NEW JUNCTION TRANSISTORS, still experimental, also use germanium but have no point contacts. Current is amplified as it flows through germanium "sandwich" —an electron-poor layer of the metal between two electron-rich ends. This new transistor runs on as little as *one-millionth* of the power of small vacuum tubes.



MUCH HAD TO BE LEARNED, especially about the surface of germanium and the effect of one part in a million of alloying materials. Transistors promise many uses—as amplifiers, oscillators, modulators . . . for Local and Long Distance switching . . . to count electrical pulses.



ASSEMBLY PROBLEMS, such as fixing hair-thin wires to barely visible germanium wafers, have been solved through new tools and mechanized techniques. Finished transistors withstand great vibration and shock. Engineers see many opportunities for these rugged devices in national defense.



MOIST PAPER AND COIN generate enough current to drive audio oscillator using junction transistors. Half as big as a penny matchbox, an experimental two-stage transistor amplifier does the work of miniature-tube amplifiers ten times larger.

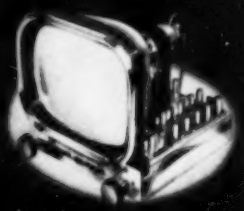
A tiny amplifying device first announced by Bell Telephone Laboratories in 1948 is about to appear as a versatile element in telephony.

Each step in the work on the transistor . . . from original theory to initial production technique . . . has been carried on within the Laboratories. Thus, Bell scientists demonstrate again how their skills in many fields, from theoretical physics to production engineering, help improve telephone service.

BELL TELEPHONE LABORATORIES

Improving telephone service for America provides careers for creative men in scientific and technical fields.

HIGH FIDELITY *is here!*



Finest made for your custom installation the CRAFTSMAN 202

ALL THE LATEST FEATURES

- **Cascode turret tuner.** Good news for fringe areas—sensitivity double that of earlier models!
- **Chassis accommodates** 21-in. cylindrical-face tube. Largest rectangular tube available, eliminates reflections. Also accommodates low voltage, electrostatic focus kinescope, permitting easier installation, focus adjustment, and maintenance of optimum focus, even with line voltage variations.
- **Push-pull audio** output provides 5 watts with less than 2% distortion. Frequency response: 20-20,000 cps.
- **Keyed AGC** prevents picture flutter due to outside interference.
- **Vertical retrace** line erase circuit.
- **Low distortion audio** channel uses double limiter and Foster-Seeley balanced discriminator.

All CRAFTSMEN TV chassis with turret tuners accommodate UHF simply by replacing tuner channel cartridges.

Write for information, or send 50c for instructions and schematics.

THE RADIO craftsmen INC.

Dept R-9, 4401 N. Ravenswood Ave.
Chicago 40, Ill.

Spot Radio News

** Presenting latest information on the Radio Industry.*

By RADIO & TELEVISION NEWS' WASHINGTON EDITOR

TV THAW STARTS SECOND "GOLD RUSH"

TELEVISION'S envisioned bright horizon, beclouded for nearly four years by conflicting engineering and legislative issues, has at long last been allowed to rise out of the murky mist and display its rich golden rays, spelling a glorious future for sound and sightcasting. For the ice age of TV has come to an end; the ether guardians in Washington have finally issued their historic report, the sixth, declaring that the freeze is over and the pattern has been set for the eventual construction of over 2000 stations in over 1300 communities. The possibility that so many stations may soon be viewcasting is truly quite a staggering fact, for today after 30 years of broadcasting, there are not many more radio stations on the air transmitting from almost as many communities. And that is not the only unusual note. Each of the new TV stations that can be built under the new plan will be able to provide wide coverage and on a round-the-clock schedule, whereas a quarter of the radio stations are still only able to operate during the daytime, and many of those on the air in the evening can be heard satisfactorily for only a few miles.

Notwithstanding the sharp criticism that has been fired at the Commission for the delays and even the allocation plan, as finally evolved, the government specialists merit resounding applause for excellence of the completed report, a 700-odd page affair, truly a herculean task. To compile the official book, over 21,000 pages of testimony and over 800 exhibits had to be studied. In addition, more than 1500 documents filed on the proposed city-by-city assignment table had to be carefully probed.

Commenting on the plan, during an address before the Institute for Education by Radio-TV in Columbus, Ohio, recently, FCC Headman Paul Walker said that it was realized that some would not approve of the assignments because of the allocations in remote areas, the power and tower restrictions and the educational channels. He noted that the plan was . . . "calculated to get stations and service into the smaller and rural areas . . ." even thought it was known that . . . "at the outset some of the communities listed in our table today might be considered too small to support their own stations." "We concluded," he added, "that enterprising individuals will come forward in many such communities to arrange the financing. . . . We considered that the television art is relatively new and that ambitious, ingenious operators will find various means of reducing costs."

The new chairman declared that the Commission's decision means that assignments are available to provide television service to practically every citizen of the country, no matter where he lives. Everyone was aware, Walker continued, that there are some . . . "differences in propagation characteristics of the ultra-high and very-high bands, but those differences are not nearly as significant as some have thought."

Describing the potentialities of the higher frequencies, the Commission's chief declared that . . . "we are convinced that the ultra-high band will be fully utilized and the u.h.f. stations will eventually compete on a favorable basis with stations in the v.h.f." Expressing his own views on the new channels, Walker said: "I have seen u.h.f. demonstrated . . . I am sold on it . . . u.h.f. is going to grow because it has to grow . . . It is needed . . . I suggest that those of you who wish to get into television, and your only chance to do so is via u.h.f., ponder very carefully before passing up that chance . . . You may be gnawed by the same remorse that has gnawed at the hearts of those during this long freeze who failed to file applications for the v.h.f. at a time when they were being granted quickly."

Praising the decision to set aside 242 channels for educators, the Commission's spokesman said that the allocation represents tremendous progress. TV might be used in some way, he felt, to provide instruction for the four-million now in classes, the one-million taking correspondence courses and the seven-million who attend demonstrations and classes conducted by county agents. It was also revealed, during the talk, that some forty per-cent recently interviewed indicated an interest in further education of a systematic kind, such as TV can afford.

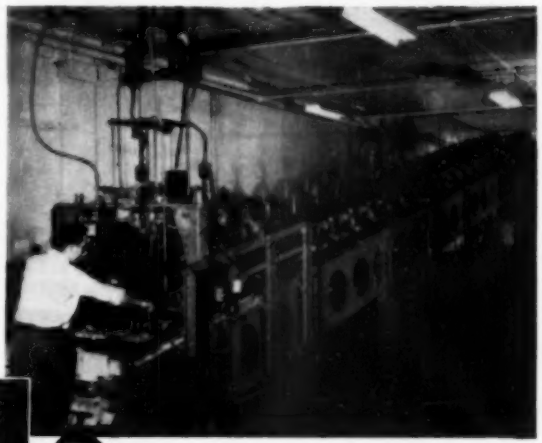
Anticipating the charge that educational institutions would not only be

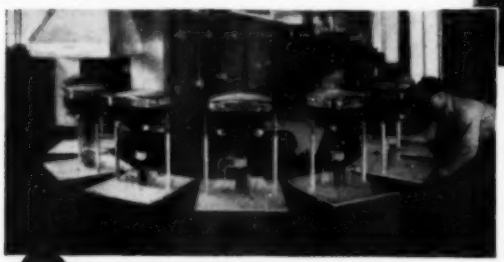
"Let Me Tell You How It Happened..."



Carl Vineglass,
Al's Radio,
Lawrence, Mass.

"FOR YEARS I'VE BEEN BUYING TUBES...A LOT OF THEM CBS-HYTRON. But I didn't know too much about CBS-Hytron. Sure, I'd seen their ads. Read about their original rectangular tube. Their 1X2A, 6BQ6GT, 12BH7, 12BY7, etc. Their handy service tools. (I just couldn't get along without my Soldering Aid.) Their Budget Plan. And so on.







"I like to know the fellows I buy from though. So last week I drove over to Salem. The CBS-Hytron gang, from President Bruce A. Coffin down, gave me a real welcome. Also the low-down on CBS-Hytron tubes, and what's behind them.





"First off, I discovered that CBS-Hytron is *big*... and getting bigger fast. I saw receiving tubes rolling out of their combined Salem and Newburyport plants at 300 a minute. With their new Danvers plant, it'll be 600 a minute! And their picture tubes run at 5000 a day! You may already know that CBS-Hytron is now a division of Columbia Broadcasting System, Inc.



"CBS-Hytron has a saying, 'Tubes are known by the company they keep.' In their shipping rooms, I saw tubes being rushed out to most of the top manufacturers and jobbers I ever heard of... and lots I don't even know.

"The reason for all the popularity wasn't hard to find. I never saw such painstaking manufacturing and testing in my life. From raw materials to finished tube. Every single tube gets the works.

"And is making tubes complicated! That ingenious machinery does everything but talk. The flying fingers of the girls assembling the tubes, though, are what caught my eye. I just couldn't believe you could get that watch-like precision with that amazing speed. And talk about engineers! I saw electronic, mechanical, chemical, metallurgical, production, industrial engineers by the score.

"I've read that CBS-Hytron's picture-tube plant is the most modern in the world. I believe it. It's really something the way that push-button, automatic plant handles those big bottles. And that new Danvers receiving-tube plant is more of the same. Floor space covers approximately five acres. Main production floor is longer (500 feet) than the longest home run ever hit by Babe Ruth. That plant has everything. They tell me the whole idea was to produce at economical top speed the finest receiving tubes in the world. To my way of thinking, they succeeded.

"Believe me, I'm glad I made that trip to CBS-Hytron. They're a real on-their-toes outfit. Before I never was too fussy what standard brand of tube I bought. But now I want CBS-Hytron, and that's that! You would, too, if you'd seen what I have."

AN OPEN INVITATION...

to all service-dealers and their distributors. You are mighty welcome to drop in at CBS-Hytron any time. How about this summer?

CBS HYTRON

HYTRON

A DIVISION OF COLUMBIA BROADCASTING SYSTEM, INC.

MAIN OFFICE: SALEM, MASSACHUSETTS



unable to finance television operations, but show little interest in accepting the challenge and favor a continuing delay before filing for a channel. Walker noted that there is nothing in the report that offers any assurance that the channels will be reserved . . . "as long as the grass grows and the water runs." For at the end of one year, he added, anyone . . . "may request the Commission to change an (unused) educational assignment to a commercial assignment."

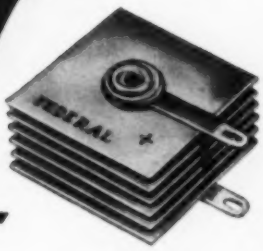
Earlier, in an address before the National Association of Radio and Television Broadcasters in Chicago, Walker issued another warning, directed, however, at the public and industry, and concerning the problem of application processing. He said that it was realized that everyone will expect a land-office business in the dispensing of grants as soon as the report becomes effective. "It just will not happen that way," he declared. The Commission does not have the staff required to roll out the grants, and a bottleneck will undoubtedly appear. Unfortunately, there are only seven examiners on hand who can conduct hearings. And they are obligated to handle other cases involving common carrier and special radio services. Not only is the Commission short of examiners, but engineers, lawyers, and accountants. The new budget, recently approved by the House committee, has been of little help. In fact, the situation has been aggravated, since some $7000 less than last year's budget has been allocated for general operations. In an attempt to assuage the Commission, the House appropriated $51,810 for . . . "new positions in connection with TV applicant processing," which was described as a piddling sum for the titanic job ahead.

SPECIFICALLY, the sixth report not only includes the assignment table, but station powers, separations, types of commercial and educational stations, processing procedures, and rules and technical standards. Many of the new rulings alter present concepts. For instance, a single class of stations now exists, in contrast to the three types that have been accepted as standard: community, metropolitan, and rural. The minimum effective radiated power has also been fixed at 50 kilowatts for stations serving a city with a population of one-million or more; 10 kilowatts in cities with from a quarter-of-a-million to a million people; 2 kilowatts for cities with from 50,000 to 250,000 population and 1 kilowatt for cities with less than 50,000. Maximum erp powers vary for channels. As an example, on Channels 2 to 6, 100 kilowatts can be used; on 7 to 13, 316 kilowatts; and on the ultra-high Channels 14 to 83, 1000 kilowatts.

Three geographic zones have also been set up, with channels assigned in accordance with the minimum mileage separations designated for each

(*Continued on page* 94)

"It pays to replace with the BEST" Federal-



The Original Miniature Selenium Rectifier!

IT PAYS YOUR CUSTOMERS in finest quality and dependable, long-life performance – proved by over 30,000,000 units shipped to the field!

IT PAYS YOU, Mr. Serviceman, in customer satisfaction and goodwill—*and a good profit on every job!*

Here Are Other Specific Reasons Why "Federal" Is Your No. 1 Choice for Servicing the Big, Growing Radio-TV Replacement Market:

- Tests by receiver manufacturers show a life expectancy of well over RTMA guarantee.
- Over 250,000 tests prove superior immunity to shelf-aging.
- Federal's synthetic barrier layer stops change during long storage.
- Quality rigidly controlled. All units fully tested before release.
- Units available either packed in the attractive Federal resale box or in bulk.
- Constant research keeps you up-to-date on rectifier progress.



SAVE TIME—SERVE YOURSELF from *Federal's* NEW

RECTIFIER DISPENSER



LOOK FOR IT ON YOUR DISTRIBUTOR'S COUNTER!



FEDERAL TELECOMMUNICATION LABORATORIES, Nutley, N. J. . . . . a unit of IT&T's world-wide research and engineering organization.

America's Oldest and Largest Manufacturer of Selenium Rectifiers

Federal Telephone and Radio Corporation

SELENIUM-INTELIN DIVISION
100 KINGSLAND ROAD, CLIFTON, NEW JERSEY
In Canada: Federal Electric Manufacturing Company, Ltd., Montreal, P. Q.
Export Distributors: International Standard Electric Corp., 67 Broad St., N. Y.

THE MIRACLE OF ELECTRONIC CONTROL

Yours to Command!



ADVANCED **THYRATRON** CIRCUIT

REMOTE CONTROL

FOR 110 VOLTS 60 CYCLES AC

Engineers — Hams — Students
Servicemen — Hobbyists

Here's the chance of a lifetime to own a genuine Thyratron Electronic Remote Control at your own at a fraction of its regular price! This mighty handful (only 5⅛x5x3¼") of miracle control can be made to perform hundreds of practical, fascinating feats of remote control.

PRECISION THYRATRON CIRCUITRY

These amazing Thyratron precision thermostatic controls can easily and quickly be modified by you for electronic remote control of: Transmitters; Turn Radio and TV on and off; Open and Close Garage Doors from your car; Remote Control of Appliances, Machinery, Power Tools; Remote Controls for Model Railroads, Planes, Boats, Trucks; Burglar, Fire, Temperature and Rain Alarm Systems; Poultry Brooder Controls, etc., etc.

Your own ingenuity and inventiveness can devise many more interesting and practical uses which this remarkable unit can control for you. A complete schematic is furnished with each control.

PARTS ALONE WORTH TWICE THE COST

Each control unit contains a highly sensitive plate circuit trigger relay, a 110 volt 60 cycle AC filament transformer, many condensers and resistors (including 1% precisions) and a host of other valuable parts worth twice or more our low, low bargain price. No matter how you use it it's a great buy!

Kit of 3 Tubes for Remote Control Unit, consisting of 6SN7GT, 6SL7GT and a GE Thyratron GL-5662 (net $3.30 by itself). All 3, *plus* Bakelite Cabinet only $4.95

No. C.O.D. Postpaid in U.S.A. Only
(10 Days Net to Rated Firms)
Send Check or Money Order to Dept. RT

only $2.88 *(Less Cabinet & Tube Kit)*
No. C.O.D. Postpaid in U.S.A. Only

Complete With Cabinet and Thyratron Tube Kit **$7.50**
No. C.O.D. Postpaid in U.S.A. Only

POPULAR REMOTE CONTROL USES

- ON-OFF for Transmitters, Radio or Television Sets
- Open and Close Garage Doors From Inside Your Car
- Model Railroads, Boats, Planes, Cars, Trucks
- ON-OFF for Appliances, Machinery, Power Tools
- Burglar, Fire, Temperature or Rain Alarm Systems
- Poultry Brooder Temperature Controls
- Remote Thermostatic Control

ATTENTION: Electronic Alarm Manufacturers! These Thyratron controls are ideal for adaptation by you for FIRE, BURGLAR and other alarm systems you make. Increase your profits, make a better product by using this control or its components in your products. Let your engineers check a few and see for yourself. Terms: Net 10 days to rated firms.

MANUEL KLEIN COMPANY 94-RT Chambers Street, New York 7, N. Y. REctor 2-6460

TRAIN for Security! Good-Paying Jobs!

MAKE THE MONEY YOU'VE ALWAYS DREAMED OF!



LEARN RADIO -TELEVISION

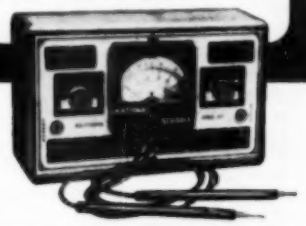
AND ELECTRONICS BY EASY SHOP METHOD TRAINING AT HOME!

You get all the parts—even tubes!— for this modern Superheterodyne Receiver. You learn to build it step by step. And you keep it! Get all the facts. Mail coupon now.

Let NATIONAL SCHOOLS—a resident-training school for nearly 50 years—train you at home for today's unlimited opportunities in Radio-Television-Electronics. National Schools is one of the largest schools of its kind. It is located in Los Angeles—the center of Radio and TV world! It has four large buildings of modern shops and labs. Its faculty is considered tops in the business.



You learn from lessons prepared by experienced instructors and engineers. Men who are successful Radio and Television technicians. Men who have trained 1000's of men like YOU!





FREE BOOK

TELLS YOU HOW!

Page after page—in *color*—tells you everything you want to know. Mail the coupon. Get this valuable book today. And if you hurry—YOU GET A FREE SAMPLE LESSON, TOO! Shows how easy National Schools Home Training is. Mail the coupon today.

You Train At Home—In Your Spare Time

National Schools Shop Method Home Training gives you basic and advanced instruction in *all* phases of Radio-TV-Electronics. And remember—your training is based on resident school training principles. You learn *fast* from hundreds of diagrams and pictures. All instructions are written by experienced technicians who work in Radio and TV every day. All instructions have been developed and tested in National Schools' own labs and studios, which are equipped with the latest RCA equipment. No wonder this National Schools course is so up-to-date, practical, interesting. And so easy to learn! And no wonder it is held in such high regard by leaders of American industry! Approved for eligible Veterans.

We Teach You How To Make Welcome Extra Money—While You Learn!

Many National Schools students—men like you—make plenty of extra dollars each week in spare time! Fixing neighbors' radios, appliances—and other ways we teach you. You start learning and earning from the day you enroll. From the very first lesson!

Only National Schools Gives You This Professional Multi-Tester!

You get this amazing, new testing instrument—factory-made and tested—complete—ready to use! Simple to operate. Accurate and dependable. An instrument every Radio-TV man needs. Light enough to carry around—so you can use it at home or on service calls. You'll be proud to own this valuable equipment.

Here are only a Few of the Good-Paying Jobs You Can Choose

Radio Station Engineer, District Service Manager, Aircraft Radio Inspector, Own Your Own Repair Shop, Inspector Technician, Service Specialist, Special Government Jobs, Complete TV Service, Sound Truck Operator, Many more!

National Schools graduates have secure, good-paying jobs like these! So don't wait—mail the coupon today. Now—while you're thinking about it!

WE SEND YOU LOTS OF PARTS LIKE THIS!



With National Schools Shop Method Home Training, you get basic principles and plenty of *practical* training. You *learn by doing*. No wonder you learn so fast! We send you many parts—all of professional, modern quality. You do lots of practical experiments. You advance day by day, step by step. Until you can even build the modern Superheterodyne Receiver you see above—plus other important testing units. The free book tells you all about it. The free sample lesson shows how easy the training is. Use the coupon. Send today — without fail!

Attention! Men Going into Service Soon!

National Schools' course quickly prepares you for many important jobs in the Armed Services. With National Schools Training you have an opportunity to get into *special* service classifications—with higher pay and grade—immediately!

FREE SERVICE FOR GRADUATES

National Schools uses its great influence and prestige to help you find your place in the field of your choice. Don't put it off! Start yourself toward a skilled trade! Get the big pay you've always wanted!

Today's Shortage of Trained Technicians Creates Chance of a Lifetime For You!

Think of it! With guided missiles, radar, and other electronic devices so important to national defense! With big, new developments in TV. With over 90,000,000 home and auto radios, over 12,000,000 TV sets. With more than 3100 radio stations...over 190 TV stations—and more building every day . . . yes, imagine the great opportunity you have today!

YOU are wanted in Radio-Television-Electronics! America's fastest-growing field. High-pay jobs—the kind you've always wanted—are waiting for YOU!

Job Security! Big Money! For YOU! in Today's Expanding Industries!

Trained Radio and Television technicians really make important money these days. Thousands of National Schools graduates—men just like you—are earning good money all over the country. Why not you?

And—National Schools graduates get the personal satisfaction of being highly-skilled technicians. Men people respect. Men who *enjoy* their work—rather than having to drag along in just any old job.

National Schools Has Trained 1000's of Successful Men! Why Not YOU?

In almost every state—and many foreign countries—National Schools graduates are filling big jobs with famous companies. Or running their own successful businesses. What are YOU waiting for? National Schools training is *complete* training. So when you graduate you can take advantage of today's big opportunities in Radio-Television-Electronics—fast.

NATIONAL SCHOOLS

LOS ANGELES 37, CALIFORNIA • ESTABLISHED 1905

In Canada: 193 Hastings St., Vancouver 4, B.C.

DON'T PUT IT OFF! GET THE BIG SALARY YOU HAVE ALWAYS WANTED!

MAIL THIS COUPON TODAY—WITHOUT FAIL!

NATIONAL SCHOOLS, Dept. HM-6
4000 South Figueroa Street
Los Angeles 37, California

Mail in envelope or paste on penny post card.

Mail me FREE the book mentioned in this ad. Also a free sample lesson. I understand no salesman will call on me.

NAME _____ AGE _____

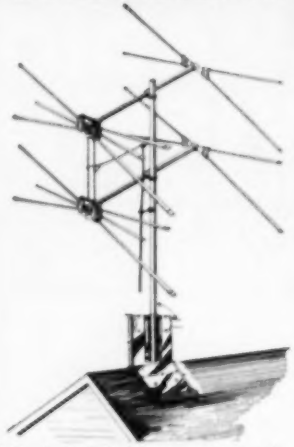
ADDRESS _____

CITY _____ ZONE _____ STATE _____

☐ Check here if you were released from the Service less than 4 years ago.

OUTSTANDING VALUES NOW AVAILABLE

RPC ALL-AMERICAN KIT



- Stacked, 10 element conical with stacking bars.
- 100 feet 300 ohm line.
- 50 feet Guy wire.
- RCA Lightning Arrestor.
- 3 mast Stand Offs.
- 3—3½" Stand Offs.
- 2—7" Stand Offs.
- Guy Ring.
- Guy Hooks.
- 4 ft. Ground Rod.
- 50 ft. Ground Wire.
- Universal Heavy Duty Base Mount.
- 2—5 ft. x 1¼" mast, heavy duty, rust-free.

Finest material made. Complete, ready for installation. ONLY..**$12.95**

SUPER SALE ITEM
ELECTRIC SOLDERING GUN



Best Made. 250 watt capacity. Heats in less than five seconds. Operates on 60 cy. 120V, AC. Trigger switch. No current or time wasted. **Lightweight.** Gives perfect balance and soldering ease. **Built-in Spotlight.** Compare this gun to any other on the market.

$9.99

Complete with nickel and brass tip. Extra tips..... **15c**

Package Sound Systems

Our engineers recommend the following in High Fidelity Sound Systems for the ultimate in fine quality.

RPC System No. 1

Meissner 9AJ, AM-FM, Radio Chassis.
Output transformer.....
Permoflux Royal Blue 8.....
Famous make 3 speed changer with turnover cartridge.....

YOUR COST....$105.95

(This system also available with a high-quality 12" speaker at no extra cost and with Jensen K-210 at $10.00 additional.)

RPC System No. 2

Meissner 8BT, AM-FM tuner.....
Grommes 50PG high fidelity amplifier
Webster-Chicago Changer.....
RCA Duo-cone 15" coaxial speaker..

YOUR COST....$179.50

(This system is also available with a Jensen K310 15" coaxial speaker at no extra cost, and with a Jensen H510 at $50.00 additional.)

RPC System No. 3

This is the "cream" of custom installation equipment, providing the ultimate in realistic, wide range, distortion-free equipment.

Radio Craftsman C 10 AM-FM Tuner.
Radio Craftsman C 500 Ultra-fidelity Amplifier.....
Webster-Chicago 3 speed changer...
Set of reluctance cartridges.....
Altec Lansing 604B Speaker.....
Altec Lansing N-1000B Crossover Network.....

YOUR COST....$440.00

We will supply all cables and connectors for simplified hookup and operation. Just unpack, connect and operate your equipment.

$5.00 extra.

We can supply any desired custom sound equipment. Write us about your problems or visit us and talk to our engineers. We will be happy to supply or recommend the equipment for your personal requirements.

Write for our latest sound release.

AMAZING VALUE
3-Way Portable TRAV-LER AC—DC Battery



- Superhet circuit.
- Tubes 1S5, 3S4, 1R5, 1U4 and Selenium Rectifier.
- Alnico V PM Speaker.
- Attractive airplane dial, luggage type case.
- Small size. 5¼" H x 8⅜" W x 4¾" D.

Exceptional reception and tone. Nowhere else at this price! **$17.59**

Batteries, 1—67½V, 2—1½V flashlite cells. **$1.85**

AUTO ANTENNAS

TOP COWL: 3 section staff, 58" extension. Bakelite insulator, chrome trim. Single hole mount. Simple installation. Complete with lead. **$1.89** each. Case of 25.....**$1.79** each

SIDE COWL: 3 section staff, 63" extension. Complete with tenite insulators. Static ball and tip shielded. Low loss lead.

$1.69 each. Case of 25 **$1.59** each

CUSTOM BUILT AUTO RADIOS

Easily installed. Fine, top quality. Ready to place in your car. Designed for each specific car.

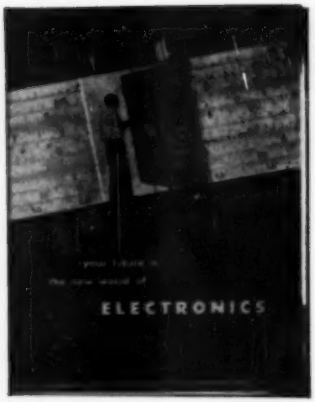
All sets—6 tube. 3 gang; super heterodyne. Extra sensitive circuit. Low battery drain. Beautiful finish and dial. These models now available:

1951—Ford
1949-50—Ford
1950-51—Studebaker
1951—Henry J
1951—Plymouth (with grill plate)
1948-49-50-51—Hudson
1951—Chevrolet
1949-50—Chevrolet
1949-50—Dodge, Plymouth (with grill panel)

List Price, **$59.95**

YOUR PRICE.....**$41.95**

Radio Parts Company, 614 RANDOLPH ST., CHICAGO 6, ILL.



How far ahead can you be next year . . .

IN TV AND ELECTRONICS?

⬅ Send for this free CREI booklet today... and find out!

THIS BOOKLET can mean the difference between small, w-i-d-e-l-y s-p-a-c-e-d salary increases—and rapid advancement. Between routine work—and challenging opportunity. Between constantly defending your job against better-trained men — and dynamic confidence. Between short-circuited hopes—and high-powered ambition.

An exciting new world has opened up with such superspeed that even the most optimistic electronic experts fall short in their predictions of expansion.

Think of the 109 TV stations now in operation, and the 2,053 new TV stations which the recent freeze-lifting will make possible. Think of the 16,785,044 TV sets now in use and the millions more soon to come. Think of the 100,000,000 radios in current operation. (95% of the nation's homes have one or more sets.) Think of the tremendous defense orders now being placed for electronic equipment and installations.

Think of the thousands of radio-equipped fire and police departments throughout the U.S. Of the many radio-equipped railroads, of the hundreds of cities with 2-way radio service for cars and cabs. Think of the wide-ranging field of aviation communications—radio-controlled aircraft, navigation-and-traffic control, airport stations.

Think of the maritime world with its navigational aids, fathometers, ship-to-shore and ship-to-ship communications and radar. Think of electronic heating, fax and ultra-fax, of electronic medicine, and all the other applications of electronic know-how.

Countless positions must be filled—in development, research, design, production, testing and inspection, manufacture, broadcasting, telecasting and servicing. Who will get those positions? You—if you prepare today—if you are alert and have the ambition to advance your knowledge. You—if you take 2 minutes to send for a free copy of "Your Future in the New World of Electronics."

This helpful book shows you how CREI Home Study leads the way to greater earnings through the inviting opportunities described above.

However, being an accredited technical school, CREI does not promise you a "bed-of-roses." You have to translate your willingness to learn into saleable technical knowledge—via *study*. Since its founding in 1927, CREI has provided thousands of professional radiomen with technical educations. During World War II, CREI trained thousands for the Armed Services. Leading firms choose CREI courses for group training in electronics at company expense, among them United Air Lines, Canadian Broadcasting Corporation, Trans Canada Airlines, Sears Roebuck & Co., Bendix Products Division, All-American Cables and Radio, Inc., and RCA-Victor Division.

CREI courses are prepared by recognized experts, in a practical, easily-understood manner. You get the benefit of time-tested materials, under the personal supervision of a CREI Staff Instructor. This complete training is the reason why CREI graduates find their diplomas keys-to-success in Radio, TV and Electronics. CREI alumni hold top positions in America's leading firms.

At your service is the CREI Placement Bureau, which finds positions for students and graduates. Although CREI does not guarantee jobs, requests for personnel currently exceed supply by far.

Talk to men in the field and check up on CREI's high standing in electronics instruction. Determine for yourself right now that your earnings are going to rise with your knowledge—and that you get your rightful place in the Age of Electronics. All this CREI can promise you, provided you sincerely want to learn. Fill out the coupon and mail it today. We'll promptly send you your free copy of "Your Future in the New World of Electronics." The rest—the future—is up to you.

MAIL COUPON FOR FREE BOOKLET

CAPITOL RADIO ENGINEERING INSTITUTE

Dept. 116D, 16th & Park Rd., N.W., Washington 10, D. C.

Send booklet "Your Future in the New World of Electronics" and course outline.

CHECK FIELD OF GREATEST INTEREST
- ☐ TV, FM & Advanced AM Servicing
- ☐ Practical Television Engineering
- ☐ Broadcast Radio Engineering (AM, FM, TV)
- ☐ Practical Radio Engineering
- ☐ Aeronautical Radio Engineering

Name .....

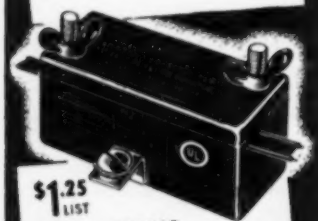
Street .....

City ..... Zone ..... State .....

If residence school in Wash., D. C., preferred, check here ☐

BE SAFE . . .
BE SURE . . .
INSTALL VEE-D-X
LIGHTNING ARRESTERS

VEE-D-X lightning arresters provide your customers with the finest, safest arresters ever made for TV and FM — including both two and four wire installations.

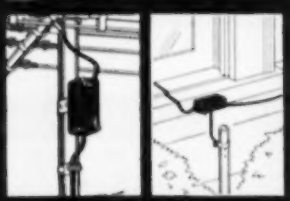


$1.25 LIST
MODEL RW-200
Most popular full size arrester for standard 2-wire transmission line. Exclusive saw-tooth contact points assure positive electrical connection.

MODEL RW-204 $1.50 LIST
For four-wire transmission. Same in appearance as the RW-200.



$2.00 LIST
MODEL RW-300
For Extra Heavy Duty



Models RW-200 and RW-204 are also available, at no extra cost, with strap for mast or pipe mounting. No wire stripping required on any VEE-D-X arrester.

THE LaPOINTE PLASCOMOLD CORP.
Windsor Locks, Conn.

Within the INDUSTRY

R. C. C. DUBOIS, JR. has been named sales manager for *RCA* mobile and microwave communications equipment.



Since 1950, he has been field sales coordinator for mobile communications and prior to that he served as a sales engineer for *RCA* broadcast and television equipment and the *RCA* Tube Department. He joined the company in 1946 after serving as a lieutenant in the U.S. Navy.

Mr. Dubois succeeds Dana Pratt, who has moved into the position of product manager for *RCA* broadcast transmitters.

• • •

TELETRONICS LABORATORY, INC. has moved its general offices and main plant to its recently-completed plant on Kinkel Street in Westbury, N. Y. The plant previously occupied by the company will be maintained as a laboratory and for engineering offices. The new building increases the company's available facilities approximately four times . . . **SHELDON ELECTRIC DIVISION** has moved its Chicago branch office and warehouse to 2300 N. Ashland Avenue where it now occupies an entire two-story structure. . . **LOWELL MANUFACTURING COMPANY** has opened a new plant at 3030 LaClede Station Road in St. Louis, Missouri to handle the increased demand for its line of speaker baffles and accessories . . . **CHESTER CABLE CORPORATION** of Chester, New York is currently in the process of adding 25,000 square feet of floor space to its existing facilities to handle the production of all types of industrial wiring material. This is the third time in the company's ten year history that such an expansion has been required.

• • •

WELLS R. CHAPIN has joined the *General Electric Company's* Electronics Division as a district sales manager for radio and television broadcasting equipment.



In his new position, Mr. Chapin will be responsible for the sale of *G-E* broadcast equipment throughout Missouri, Kansas, Nebraska, and most of Illinois and Indiana. He will make his headquarters at 4227 Lindell Blvd., St. Louis, Mo.

He was formerly chief engineer of radio station WIL in St. Louis and during the war worked as a field engineer for the *Raytheon Manufacturing Company*. His experience includes work on many types of radar, sonar, and radio communications equipment.

Mr. Chapin has been a ham for 32 years and is active in amateur activities in the St. Louis area.

• • •

HERMAN C. BELDEROK of Freeport, Long Island, New York has been named president of the newly-formed Alumni Association of *RCA Institutes*.

Other officers of the new organization include: Isaac Boreshafsky, vice-president; Rose Scarpa, treasurer; and Carl Bollinger, secretary.

The purpose of the Association is to create closer ties between graduates of the Institute and to further common interests in education, social activities, and technical recognition. All graduates of *RCA Institutes* are eligible to become members of the Association.

Alumni should contact the secretary at 157 E. 89th Street, New York, New York for additional information on scheduled meetings.

• • •

BRUCE E. VINKEMULDER has been named distributor sales manager of the Capacitor Division of *Sangamo Electric Company*, Springfield, Illinois.



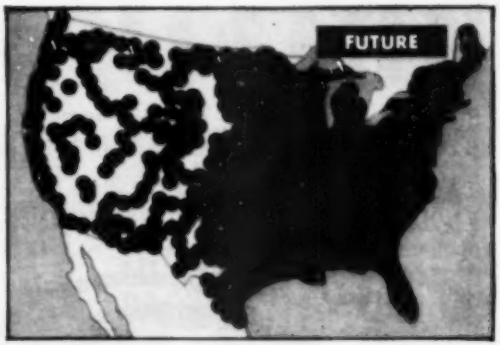
He joined the company in 1946 and has been in charge of engineering publications for electronic equipment manufactured by the firm at its Springfield plant.

Since the Capacitor Division is located in Marion, Illinois, Mr. Vinkemulder has moved his headquarters to the Marion factory.

• • •

ULTRASONIC CORPORATION of Cambridge, Mass. has acquired **THE MONITOR CONTROLLER COMPANY** of Braintree, Mass. The parent company will use the new subsidiary's production facilities for the manufacture of certain of its sonic and electronic computer equipment in addition to the continued production of *Monitor's* motor control and switch gear equipment . . . **COLUMBIA ELECTRONICS LTD.**, formerly of Los Angeles and North Hollywood, has merged with **ARROW SALES, INC.**, formerly of Chicago, and will operate as **ARROW SALES, INC.** with headquarters in its own recently-constructed building at 7640 Varna Avenue, North Hollywood, California . . . **NATIONAL ELECTRIC PRODUCTS CORPORATION** has announced the establishment of an Electronics Division with headquarters at Ambridge, Pa. The new division will consist of two departments—television and radio, and





FUTURE—*How new TV stations are expected to cover the nation.*
PRESENT—*Chart shows extent of current coverage.*

Cash in on this Great Opportunity

. . . for good-pay jobs in TV SERVICING

YES, thousands of opportunities are going begging right now for good-pay jobs in TV Servicing.

The lifting of the "freeze" on new television stations clears the way for the expansion of the industry for 2,053 new stations, in 1,291 communities in the United States, its territories and possessions. There are only 108 stations telecasting now.

This is your golden opportunity to get all set for a good job that can mean employment security and a bright future for years to come. It's a great opportunity that can lead you, as a trained and experienced TV Serviceman, into establishing a profitable business of your own.

Big shortage of TV Technicians creates opportunities—NOW

Industry experts have estimated over 130,000 experienced TV technicians will be needed for the installation, trouble-shooting and repairing of television receivers in use by 1955. There are fewer than 50,000 fully trained TV service technicians available today. What an opportunity this creates for you!

Here are some of the good-pay jobs you can choose—installation and trouble-shooting of TV receivers in homes . . . bench technician in radio-TV service shops . . . inspector, tester, repairman, field serviceman for TV receiver manufacturers, distributors and dealers . . . testing and servicing with electronic instrument manufacturers and companies with military contracts for electronic equipment . . . civilian serviceman with U. S. Military Bases . . . your own TV service shop—and many more.

RCA Institutes home study course trains you in your spare time

If you are associated with the radio-electronics industry, with no experience in TV servicing, the addition of the RCA Institutes Home Study Course in TV Servicing to your present experience will quickly qualify you to step out and grasp the good jobs now open in television.

The RCA Institutes course gives you a sound knowledge of television fundamentals . . . intensive practical instruction on the proper maintenance and servicing of TV receiver circuits . . . teaches you the "short cuts" on TV installation and trouble-shooting. Learn TV servicing (based on actual experience of hundreds of skilled technicians) from RCA engineers and experienced instructors—pioneers and leaders in radio, television and electronic developments.

RCA Institutes home study course planned to your needs

You keep your present job. In your spare time, you study at home. You learn "How-to-do-it" techniques with "How-it-works" information in easy-to-study lessons prepared in ten units. Cost of RCA Home Study Course in Television Servicing has been cut to a minimum—as a service to the industry. You pay for the course on a "pay-as-you-learn" unit lesson basis. You receive an RCA Institutes certificate upon completion of the course. The RCA Institutes Home Study Course in Television Servicing is approved by leading servicemen's associations.

Don't pass up this lifetime opportunity for financial security and a bright future in TV.

SEND FOR FREE BOOKLET

Mail the coupon—today. Get complete information on the RCA INSTITUTES Home Study Course in Television Servicing. Booklet gives you a general outline of the course by units. See how this practical home study course trains you quickly, easily. Mail coupon in envelope or paste on postal card.

RCA Institutes conducts a resident school in New York City offering day and evening courses in Radio and TV Servicing, Radio Code and Radio Operating, Radio Broadcasting, Advanced Technology. Write for free catalog on resident courses.

MAIL COUPON NOW!



RCA INSTITUTES, INC., Home Study Department EN-652
350 West Fourth Street, New York 14, N. Y.

Without obligation on my part, please send me copy of booklet "RCA INSTITUTES Home Study Course in TELEVISION SERVICING." (No salesman will call.)

Name_____
(please print)

Address_____

City_____ Zone_____ State_____

RCA INSTITUTES, INC.
A SERVICE OF RADIO CORPORATION of AMERICA
350 WEST FOURTH STREET, NEW YORK 14, N.Y.



You headphone users have always known just what you want—flat response, high sensitivity, low distortion, rugged construction, lightweight, comfortable design. Now for the first time, all of these features are combined in a single headphone designed around the exclusive BIMORPH CRYSTAL* drive element. These outstanding, new headphones result from Brush pioneering and experience in acoustics and electronics.

- Exceptionally flat frequency response
- Exceptional bass response
- Low distortion
- Lightweight—designed for comfortable wear
- Sensitivity is approximately 6.3 dynes/cm²/volt at 1000 cps.
- Exclusive METALSEAL CRYSTAL* for protection against high humidity
- Impedance of 100,000 ohms at 1000 cps.
- No transformer required
- Multiple installations are readily made

Available from your local radio parts jobber in three styles: Double headset, Single headset and Lorguette style.



Brush Microphones—Superior Brush crystal microphones are available in five models. See them at your dealer.

*Trade Mark Registered

THE Brush DEVELOPMENT COMPANY
3405 Perkins Avenue • Cleveland 14, Ohio

BRUSH

Piezoelectric Crystals & Ceramics
Magnetic Recording Equipment
Acoustic Devices
Ultrasonics
Industrial & Research Instruments

radar. The new division will manufacture and distribute a line of television antennas, masts, and a complete line of TV roughing-in materials, as well as special types of wire for TV use . . . **AUDIO ARTS ASSOCIATES** has been established at 1323 South Michigan Avenue, Chicago 5, Illinois to distribute high-fidelity audio-video equipment and supervise its installation and servicing. The company is also offering custom engineering and design services.

• • •

ROBERT J. TARLTON has been named chief field engineer for *Jerrold Electronics Corp.*, succeeding Caywood C. Cooley who recently became the firm's sales manager.



Mr. Tarlton formerly served as general manager of the *Panther Valley Television Co., Inc.*, one of the best known community antenna systems in the country.

As chief field engineer, he will assume the responsibility for guiding research and development of equipment and providing field service and maintenance for communities using *Jerrold* equipment throughout the U. S.

• • •

RADIO CORPORATION OF AMERICA has presented a documentary record of more than a half-century of radio pioneering and development to the Massachusetts Institute of Technology as an industrial supplement to the M.I.T. Library.

The historical array of documents, known as the "*RCA*-Clark Collection of Radioana," represents the equivalent of approximately 5000 volumes. It includes correspondence files of early radio companies, photographs, blueprints, specifications, research reports, records of litigation, log books, unpublished biographies of the great pioneers, scrapbooks, etc. with particular emphasis on the period between 1900 and 1935. George H. Clark, M.I.T. '03 and an *RCA* official, collected the material.

• • •

THOMAS B. KALBFUS has been appointed general radio and television sales manager for the *Westinghouse Electric Supply Company*. The supply firm is the national wholesale marketing outlet for the *Westinghouse Electric Corporation*.



In his new capacity, Mr. Kalbfus will be responsible for the distribution, sales, advertising, and promotion of the company's radio and television receivers through the supply firm's 110 branches.

A native of Rochester, New York,

(*Continued on page 80*)

Superior's TELEVISION BAR GENERATOR



THROWS AN ACTUAL BAR PATTERN ON ANY TV RECEIVER SCREEN!!

Two Simple Steps

1. **Connect Bar Generator to Antenna Post of any TV Receiver.**
2. **Plug Line Cord into A.C. Outlet and Throw Switch.**

RESULT: A stable never-shifting vertical or horizontal pattern projected on the screen of the TV receiver under test.

Features:

1. Provides linear pattern to adjust VERTICAL linearity, height, centering.
2. Provides linear pattern to adjust HORIZONTAL drive, width, peaking, linearity, centering.
3. Provides vertical sweep signal for adjusting and synchronizing vertical oscillator discharge and output tubes.
4. Provides vertical signal to replace vertical oscillator to check vertical amplifier operation.
5. Provides horizontal sweep signal for adjusting and synchronizing horizontal oscillator A.F.C. and output tubes.
6. Provides horizontal sweep signal to check H.V. section of fly-back and pulse operating power supplies.
7. Provides signal for testing video amplifiers.
8. Can be used when no stations are on the air.

Specifications:

Power Supply: 105-125 Volt 60 Cycles
Power Consumption: 20 Watts
Channels: 2-5 on panel, 7-13 by harmonics
Horizontal lines: 4 to 12 (Variable)
Vertical lines: 12 (Fixed)
Vertical sweep output: 60 Cycles
Horizontal sweep output: 15,750 Cycles

TV BAR GENERATOR COMES COMPLETE WITH SHIELDED LEADS AND DETAILED OPERATING INSTRUCTIONS. ONLY . . .

39.95 NET



SEND FOR YOUR *FREE* COPY OF OUR CATALOG TODAY!

THE "SUPERIOR" LINE

We have been manufacturing Test Equipment for twenty years . . . rugged instruments designed for all 'round use—in the shop—in the basement—in the house. Our units can be piled in the back of your car with the rest of your gear. Accurate? We *must* make our units accurate to required tolerances to stay in this business. Not the 1/10th of 1% required by laboratory technicians but the 2% accuracy required for service work. Price? Compare the dealer's price of any model in our line with the price of any comparative unit. Ours is *always* lower priced.

Write Dept. RN-6 for your FREE Catalog

Manufactured and Guaranteed by
SUPERIOR INSTRUMENTS CO.
227 Fulton Street, New York 7, N. Y.

BUY IT AT YOUR RADIO PARTS JOBBER.



You headphone users have always known just what you want—flat response, high sensitivity, low distortion, rugged construction, lightweight, comfortable design. Now for the first time, all of these features are combined in a single headphone designed around the exclusive BIMORPH CRYSTAL* drive element. These outstanding, new headphones result from Brush pioneering and experience in acoustics and electronics.

- Exceptionally flat frequency response
- Exceptional bass response
- Low distortion
- Lightweight—designed for comfortable wear
- Sensitivity is approximately 6.3 dynes/cm²/volt at 1000 cps.
- Exclusive METALSEAL CRYSTAL* for protection against high humidity
- Impedance of 100,000 ohms at 1000 cps.
- No transformer required
- Multiple installations are readily made

Available from your local radio parts jobber in three styles: Double headset, Single headset and Lorguette style.



Brush Microphones—Superior Brush crystal microphones are available in five models. See them at your dealer.

*Trade Mark Registered

THE Brush DEVELOPMENT COMPANY
3405 Perkins Avenue • Cleveland 14, Ohio

BRUSH

Piezoelectric Crystals & Ceramics
Magnetic Recording Equipment
Acoustic Devices
Ultrasonics
Industrial & Research Instruments

radar. The new division will manufacture and distribute a line of television antennas, masts, and a complete line of TV roughing-in materials, as well as special types of wire for TV use . . . **AUDIO ARTS ASSOCIATES** has been established at 1323 South Michigan Avenue, Chicago 5, Illinois to distribute high-fidelity audio-video equipment and supervise its installation and servicing. The company is also offering custom engineering and design services.

• • •

ROBERT J. TARLTON has been named chief field engineer for *Jerrold Electronics Corp.*, succeeding Caywood C. Cooley who recently became the firm's sales manager.



Mr. Tarlton formerly served as general manager of the *Panther Valley Television Co., Inc.*, one of the best known community antenna systems in the country.

As chief field engineer, he will assume the responsibility for guiding research and development of equipment and providing field service and maintenance for communities using *Jerrold* equipment throughout the U. S.

• • •

RADIO CORPORATION OF AMERICA has presented a documentary record of more than a half-century of radio pioneering and development to the Massachusetts Institute of Technology as an industrial supplement to the M.I.T. Library.

The historical array of documents, known as the "*RCA*-Clark Collection of Radioana," represents the equivalent of approximately 5000 volumes. It includes correspondence files of early radio companies, photographs, blueprints, specifications, research reports, records of litigation, log books, unpublished biographies of the great pioneers, scrapbooks, etc. with particular emphasis on the period between 1900 and 1935. George H. Clark, M.I.T. '03 and an *RCA* official, collected the material.

• • •

THOMAS B. KALBFUS has been appointed general radio and television sales manager for the *Westinghouse Electric Supply Company*. The supply firm is the national wholesale marketing outlet for the *Westinghouse Electric Corporation*.



In his new capacity, Mr. Kalbfus will be responsible for the distribution, sales, advertising, and promotion of the company's radio and television receivers through the supply firm's 110 branches.

A native of Rochester, New York,

(*Continued on page 80*)

Superior's TELEVISION BAR GENERATOR



THROWS AN ACTUAL BAR PATTERN ON ANY TV RECEIVER SCREEN!!

Two Simple Steps

1. **Connect Bar Generator to Antenna Post of any TV Receiver.**
2. **Plug Line Cord into A.C. Outlet and Throw Switch.**

***RESULT:** A stable never-shifting vertical or horizontal pattern projected on the screen of the TV receiver under test.*

Features:

1. Provides linear pattern to adjust VERTICAL linearity, height, centering.
2. Provides linear pattern to adjust HORIZONTAL drive, width, peaking, linearity, centering.
3. Provides vertical sweep signal for adjusting and synchronizing vertical oscillator discharge and output tubes.
4. Provides vertical signal to replace vertical oscillator to check vertical amplifier operation.
5. Provides horizontal sweep signal for adjusting and synchronizing horizontal oscillator A.F.C. and output tubes.
6. Provides horizontal sweep signal to check H.V. section of fly-back and pulse operating power supplies.
7. Provides signal for testing video amplifiers.
8. Can be used when no stations are on the air.

Specifications:

Power Supply: 105-125 Volt 60 Cycles
Power Consumption: 20 Watts
Channels: 2-5 on panel, 7-13 by harmonics
Horizontal lines: 4 to 12 (Variable)
Vertical lines: 12 (Fixed)
Vertical sweep output: 60 Cycles
Horizontal sweep output: 15,750 Cycles

TV BAR GENERATOR COMES COMPLETE WITH SHIELDED LEADS AND DETAILED OPERATING INSTRUCTIONS. ONLY . . .

39.95 NET



SEND FOR YOUR *FREE* COPY OF OUR CATALOG TODAY!

THE "SUPERIOR" LINE

We have been manufacturing Test Equipment for twenty years . . . rugged instruments designed for all 'round use—in the shop—in the basement—in the house. Our units can be piled in the back of your car with the rest of your gear. Accurate? We must make our units accurate to required tolerances to stay in this business. Not the 1/10th of 1% required by laboratory technicians but the 2% accuracy required for service work. Price? Compare the dealer's price of *any* model in our line with the price of any comparative unit. Ours is *always* lower priced.

Write Dept. RN-6 for your FREE Catalog

Manufactured and Guaranteed by
SUPERIOR INSTRUMENTS CO.
227 Fulton Street, New York 7, N. Y.

BUY IT AT YOUR RADIO PARTS JOBBER.



Choose From These Famous Brands

- B&W AUDIO OSCILLATOR
- SYLVANIA SCOPES
- SYLVANIA TUBE TESTERS
- RCA VOLTOHMYSTS
- HICKOK SIGNAL GENERATORS
- HICKOK TUBE TESTERS
- HICKOK SCOPES
- HICKOK CROSS HATCH GENERATOR
- HICKOK VTVM'S
- HICKOK VOLTAGE CALIBRATOR
- HICKOK 650 VIDEO GENERATOR
- JACKSON OSCILLATORS
- JACKSON CONDENSER TESTER
- JACKSON SCOPES
- JACKSON SIGNAL GENERATORS
- EMC VOM'S
- EMC VTVM'S
- SUPERIOR INSTRUMENTS 777 TUBE TESTER
- SUPERIOR INSTRUMENTS VOM'S
- SUPERIOR INSTRUMENTS SIGNAL GENERATORS
- SUPERIOR ELECTRIC BAR GENERATOR
- SUPERIOR ELECTRIC 670 VOM
- PRECISION APPARATUS SIGNAL GENERATORS
- PRECISION APPARATUS SCOPES
- PRECISION APPARATUS TUBE TESTERS
- PRECISION APPARATUS EV-20 VTVM
- EICO KITS
- EICO WIRED UNITS
- TRIPLETT VOM'S
- TRIPLETT VTVM'S
- SIMPSON VTVM'S
- SIMPSON VOM'S
- SIMPSON FIELD STRENGTH METER
- SIMPSON SIGNAL GENERATORS
- SIMPSON GENESCOPE
- SIMPSON MIRRORSCOPE
- SIMPSON CAPACITY BRIDGE
- SIMPSON OSCILLOSCOPE CALIBRATOR

NOW! HISTORY-MAKING TRADE-IN ALLOWANCES ON YOUR USED TEST EQUIPMENT

So great is the demand for our used, reconditioned test equipment that stocks are depleted. As a result, we have had to do something drastic to build up our supply. So we're forced to go higher than ever before with "Surprise" trade-in allowances on used test instruments. That's why you can now get the new equipment you need with the least possible strain on the old pocketbook. So make your choice from our complete stocks now on hand and ready for immediate delivery. Every instrument in factory-sealed carton. Get your trade-in deal working right now. Wire, write, phone or use the handy coupon.

All prices F.O.B. St. Louis • Phone CHestnut 1125

FREE! NEW 1952 CATALOG

Walter Ashe RADIO CO.
1125 PINE ST. • ST. LOUIS 1 MO.

Walter Ashe Radio Co. RTN-52-6
1125 Pine St., St. Louis 1, Mo.
☐ O. K. Walter, Rush "Surprise" Trade-in-offer on my
_____
for _____
(show make and model No. of new equipment desired)
☐ Rush Free Copy of your new Catalog.
NAME _____ ADDRESS _____
CITY _____ Zone ____ STATE _____

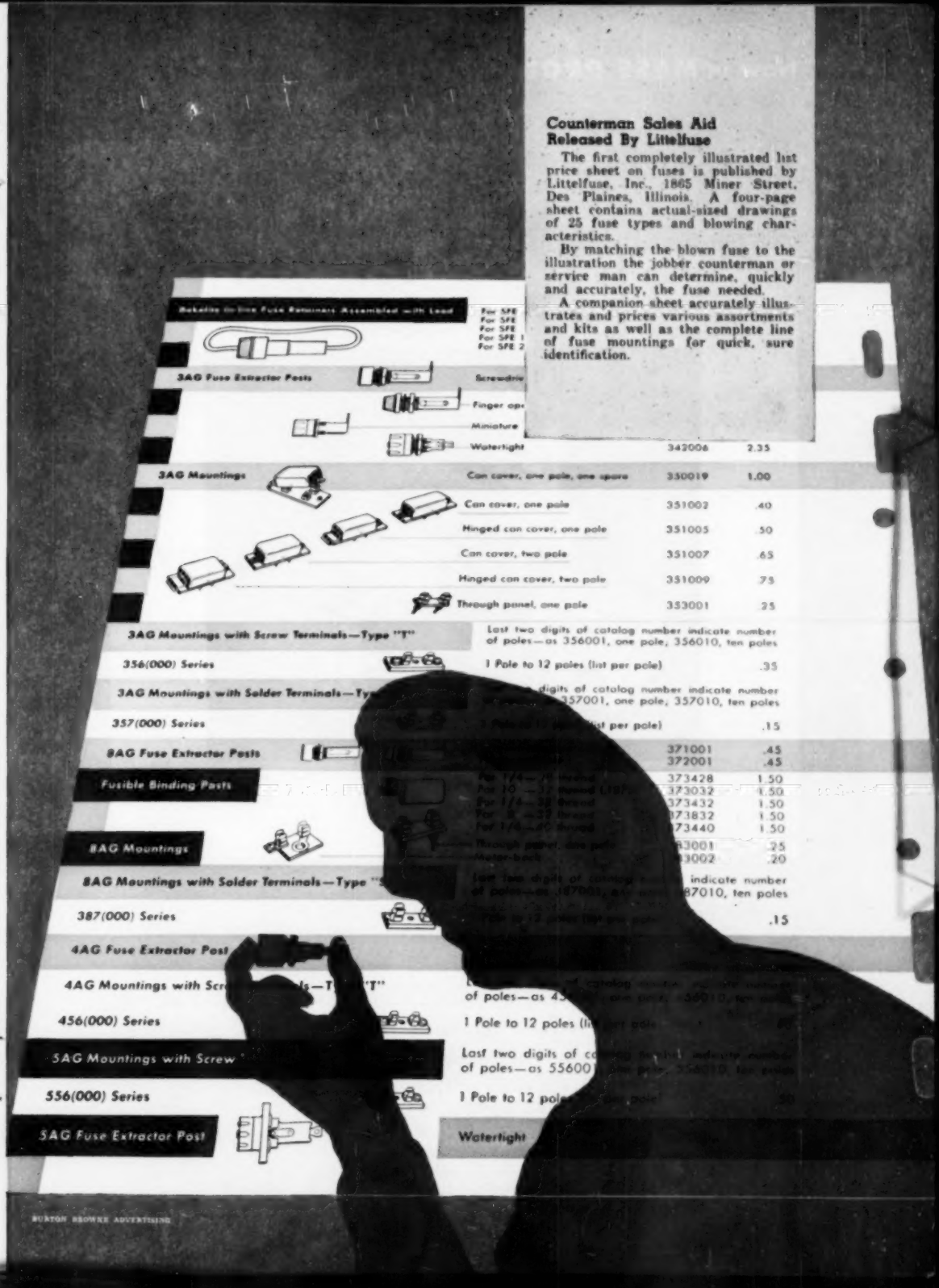
SEND FOR YOUR COPY TODAY!

Counterman Sales Aid Released By Littelfuse

The first completely illustrated list price sheet on fuses is published by Littelfuse, Inc., 1865 Miner Street, Des Plaines, Illinois. A four-page sheet contains actual-sized drawings of 25 fuse types and blowing characteristics.

By matching the blown fuse to the illustration the jobber counterman or service man can determine, quickly and accurately, the fuse needed.

A companion sheet accurately illustrates and prices various assortments and kits as well as the complete line of fuse mountings for quick, sure identification.



BURTON BROWNE ADVERTISING

Now in **MASS PRODUCTION...**

PYRAMID ULTRA-COMPACT

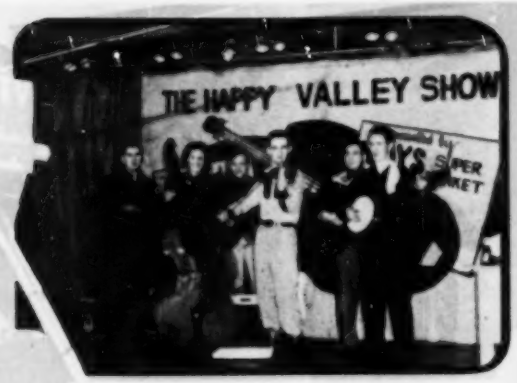
metallized paper capacitors



PYRAMID Series M CAPACITORS use a specially-prepared metallized paper, providing all-important savings in size and weight. Pyramid now produces large quantities of these capacitors in a wide variety of cardboard or hermetically sealed metal containers.

Your letterhead inquiries are invited

PYRAMID ELECTRIC COMPANY • 1445 HUDSON BLVD., North Bergen, N. J.



WTTV in Bloomington, Ind., has developed several popular "live" shows which are of local interest and feature "home-towners."

WHAT'S AHEAD for Small-Town Television?

With the lifting of the freeze a potential of nearly 2060 new stations exists. Careful planning is required before such stations go on the air. Here are some factors to consider.

By
NORMAN SKLAREWITZ

LIKE prosperity of the 1930's, small-town television in the '50's has been "just around the corner" for almost four years. During that time, a good percentage of the nation has impatiently awaited the advent of this, the most fabulous medium of mass entertainment that the world has ever seen.

Now finally, in the summer of 1952, it seems that we've at last rounded that elusive corner. Video broadcasting in farm towns, western county seats, and in dozens of other small and medium-sized communities will undoubtedly be a reality before the end of the year.

Now that the FCC, lifting its long-standing "freeze" on new station construction, has opened the door for 2053 potential stations throughout the U. S., the much heralded "gold rush" for building permits and licenses has begun. Even so, it is a safe bet that while you read this page, there is still as much fuss and confusion going on over the actual status of small-town TV as there was six months ago.

Of the more than 2000 new stations that will eventually be built, less than 100 will actually be putting out a signal before Christmas. This may come as a rude shock to many millions who thought they'd be seeing the World Series from their parlors regardless of where they lived. That just won't be.

In view of the fact that owners have been desperately trying to get on the air for years, the public and the industry alike are obviously going to ask a loud "Why?" Everyone assumed that only release from government restrictions was needed to open up these new stations.

But the situation isn't that simple. An understanding of two basic problems is needed to fully appreciate the complex background of the present picture. The first involves the reasons for the construction freeze in the first place. The second must take into consideration the many technical, legal, and financial issues involved in putting this unprecedented number of new stations on the air.

The freeze went into effect suddenly on September 30, 1948 when the FCC issued its now-famous "Report and Order" that prohibited any new TV stations from going on the air. At that moment 107 stations, all on v.h.f. channels, were in operation.

The halt was supposed to last only a short time. During this period, engineers were to work out details of proper separation of stations on the same and adjacent channels. This was necessary since certain stations were experiencing interference due to tropospheric bending of the waves far beyond the line of sight and into the service areas of other stations.

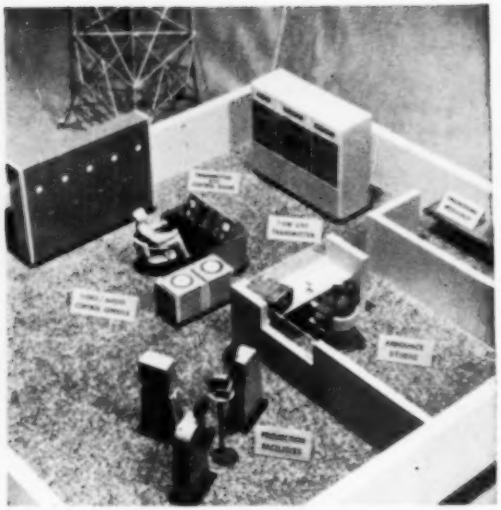
The 485-foot tower of WHBF-TV in Rock Island, Illinois. The antenna is in the downtown business section and adjoins the WHBF studio shown in front of steel tower.

That seemed harmless enough at the time. However, as the study moved along, the technicians found they were getting into something that involved more than simple frequency adjustment. Merely theoretical information about tropospheric effects in the band was available and new data could be had only by making involved tests and checks at different points around the country.

That took time and only served to reveal that more study was needed. The FCC found, for example, that separation of v.h.f. stations varied with their location in the country. The average figure was greater in the Gulf States area, for example, where tropospheric effects are prevalent for long periods of time, than it was in the thickly populated centers of the East where there was a greater demand for



RCA's TT500A 500-watt transmitter which has been designed for small-town installations. Compact in construction, the unit is housed in two identical cabinets, one for video and the other for audio. Console in foreground controls transmitter.



Model layout of RCA's "Basic Buy" station employing a 1 kw. u.h.f. transmitter. With the film facilities and announcing booth provided, network, film, slides, spots, and remote pick-ups can be handled by these relatively modest TV facilities.

	V.H.F.	U.H.F.
RADIATED POWER	10 KW.	20 KW.
Simplest station, film and network facilities only, no live cameras	$137,500	$145,000
Tower (if not available locally)	31,000	31,000
Total	$168,500	$176,000
Local studio equipment (two cameras and simple lighting for one studio)	70,000	70,000
Total	$238,500	$246,000
Remote pickup truck with relay (does not include additional live cameras)	24,700	24,700
Total	$263,000	$270,000

Note: The u.h.f. stations in cities under 1,000,000 population may start at 20 kw. radiated power at the costs indicated and then add an amplifier later to increase power to 200 kw. radiated.

Approximate costs for simplified TV stations suitable for small-town operation.

The Du Mont nine-channel master control studio director's console which gives the director complete control of all programs originating either inside or outside of the studio. The TV director sits at the center desk with an audio engineer at his left and a program director at his right. The console can lap, fade, superimpose, etc.



v.h.f. channels and where transmission characteristics were more favorable.

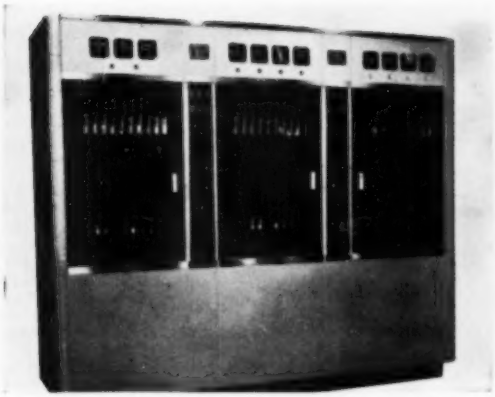
It was readily apparent that permitting new stations to go on the air under these circumstances would only aggravate the situation. So the freeze was ordered continued while engineering studies were extended.

As the project moved on, it became obvious that the demand for new stations could not be met within the limitations of the v.h.f. band. Here, from 30 to 300 megacycles, there was no room for expansion. But the FCC cast interested eyes upward to the u.h.f. band extending from 300 to 3000 megacycles.

In that portion of the band extending from 470 to 890 megacycles, the FCC figured it could accommodate 70 additional TV channels as opposed to the scanty 12 available to v.h.f. Experimentation was begun soon afterward to test the practicality of u.h.f. Licenses were granted to 15 experimental stations with the most successful work being undertaken by *NBC* at Bridgeport, Conn. There experimental station KC2XAK went on the air on December 30, 1949 rebroadcasting, via u.h.f. programs picked up by a microwave link from WNBT in New York City.

Receiver manufacturers joined the project by testing home sets and converters to handle the proposed u.h.f. stations. The results of this work have been incorporated into most of the new models now available or soon to be announced to the consumer public.

After more than a year's research, the FCC was satisfied that the u.h.f. band had, indeed, the answer to the problems of new station allocation. It offered the possibilities for excellent,



RCA's first commercial TV unit for the u.h.f. bands. It is a 1 kw. transmitter which is housed in three aluminum cabinets having sliding front and rear doors which are properly interlocked. A vertical chassis type construction is used for convenience and accessibility. The front and back doors slide into the space between the end shields so that a minimum of floor space is required. The blower unit, providing air-cooling, is contained within the transmitter. The new Model TTU-1B is designed to operate on all u.h.f. channels from 14 to 83.



Du Mont's unique new 16 mm film system for TV broadcasting which combines the advantages of the flying spot scanner system with continuous-motion film in a single package. The unit is low in cost, easy to maintain, and requires no operator for shading adjustments. Its use poses no back or rim light problems. Scheduled for release to the public in twelve months, the manufacturer states that its adoption will not obsolete image orthicon studio equipment and that it can be adapted for color TV. The new system can be used as a film recorder.

almost interference-free, TV service. Especially interesting was its relative freedom from interference from ignition systems and other electrical and atmospheric sources that plague v.h.f. reception. Equally important, stations could be placed closer together permitting a far greater number of stations on the air.

All this work, however, was taking time. In the meantime, the commercial aspects of TV had blossomed forth in all their lush, greenback hues. Owners once pitied for rashly "throwing away their money" were now sitting atop the biggest entertainment gold mine in history. Others soon pounded on the doors of opportunity to be let in.

Pressure began to mount for the FCC to lift its ban. Even though it was working entirely in the public interest, the Commission found itself constantly harassed. Chairman Wayne Coy accurately noted that, "Seldom in our time has a 'freeze' managed to generate so much heat!"

The Commission, however, didn't hesitate to point out that many of the same people now clamoring for space on the TV bands were the same ones who, in 1948, wouldn't even take channels when offered them. Then the huge financial losses experienced by the pioneers frightened away the timid.

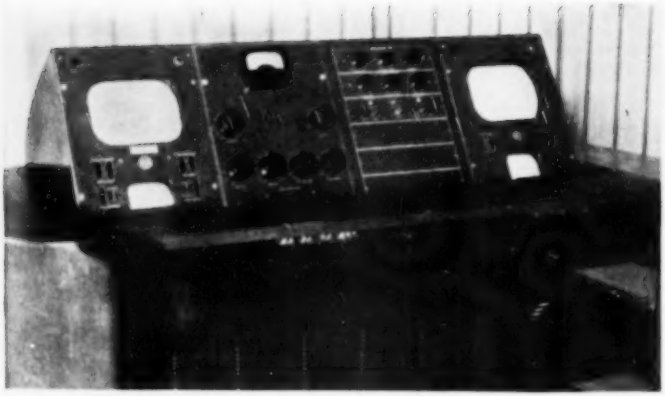
But now that TV programs had tapped seemingly bottomless revenue,

G.E.'s "Side-Fire Helical Antenna" for u.h.f. It has a power gain of 5 per bay and is available in any number of bays up to and including 5. There is one feedpoint per bay, with the supporting mast acting as the outer cylinder of coax feedline.

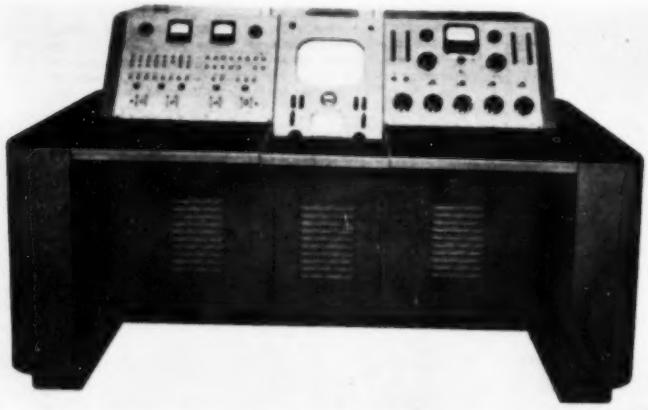


Federal's "Poly-Flex" scanner, Model FTL-93A, for small station operation. The unit provides complete program control, four-channel video switching, video signals from two slide sources, in addition to montages and various special effects.





Close-up view of the four console sections and associated control panels which are part of Radio Corporation of America's "Basic Buy" television station package.



Over-all view of the master control console for Federal's television transmitters.

thousands stampeded to get space. Even so, finding spectrum space for all these eager owners wasn't the only problem on board. Color television joined in to become a mean issue. Then it was "Phonevision," polycasting, "Stratovision," and educational TV. Each in its turn had to be considered and dealt with and each of these important decisions delayed lifting the freeze.

Thus it wasn't until January of this year that Mr. Coy announced to an audience of newspapermen at a banquet in Cleveland that the freeze would probably be lifted ". . . in a month or so." That was the first official word on the ban issued in months. Then came the April 13 announcement by Paul A. Walker, new chairman of the FCC, of the lifting of the freeze.

With this, the FCC announced its readiness to accept new station applications. This will go on for at least 60 days—perhaps 90. During this period of the so-called "gold rush," the FCC has braced itself to receive literally thousands of new applications. The final order and table of allocations invites applications for more than 2000 new television stations of which about 550 will be in the v.h.f. band and the remainder in the u.h.f. band.

From whom will these applications come? Well, many of them will originate with owners of radio stations and newspapers or others with experience in public entertainment or public service. But many hundreds more will undoubtedly come from private business interests who are willing to gamble a sizable fortune on a pretty sure thing.

Actually the FCC states that ". . . any qualified citizen, firm, or group may apply . . . for authority to construct a commercial TV broadcast station. In general, applicants must satisfy the Commission that they are le-

(*Continued on page* 117)

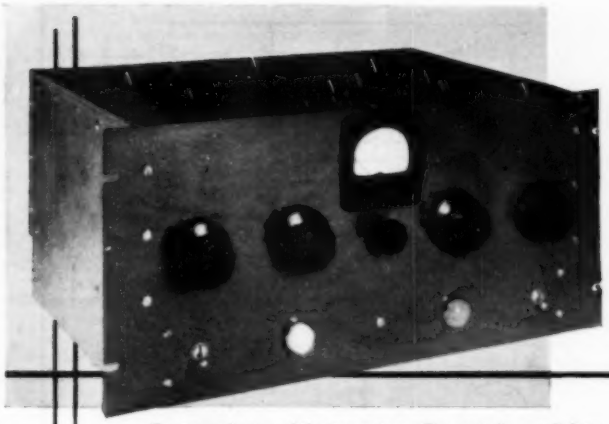
NBC's experimental u.h.f. station in Bridgeport. The transmitter is on the rear wall (left) and racked audio-visual equipment (right). Control console and turntables are in center.



Close-up view of General Electric's 100-watt u.h.f. transmitter. It has been especially designed for small-town stations and provides good reception up to from eight to ten miles.



A 250-WATT TVI-PROOF TRANSMITTER



Front panel view of the transmitter. The controls are: (left to right) the drive control (R.); 6L6 plate tuning condenser; meter selector switch; variable link control; and final tank condenser. The bottom row of controls includes the filament switch, the filament pilot light, the plate pilot light, and the plate switch.

By
ROBERT F. LEWIS
WBMQU

Construction details on a well-designed transmitter which covers the 80, 40, 20, and 10 meter ham bands.

PROBABLY the most serious problem which has ever confronted the amateur fraternity is that of television interference. The situation has reached such proportions in many areas that hams have deserted the higher frequencies in droves. Some have even discontinued operation entirely. With television stations now increasing their air time periodically, it is constantly putting a greater squeeze on the amateur. This will continue until he is faced with the choice of finding a cure or throwing in the towel.

The problem is not too difficult to solve in cities where the television stations are located. This is especially true where the amateur is using moderate power or is operating on the lower frequencies. In outlying sections, however, where television signals are greatly attenuated, the situation may become very serious, regardless of operating frequency or power.

In general, television interference can be boiled down to two major causes. The radiation of harmonics which fall within television channels is the most common. Trouble can also result from blanketing by the fundamental signal. This, however, is usually due to some deficiency in the receiver, and steps to cure the trouble must then be taken accordingly.

Reduction of interference caused by harmonic radiation, however, falls right into the lap of the amateur. The amount of effort necessary to eliminate the trouble varies in inverse proportion to the strength of the television signal. The following is a description of a transmitter which was designed for operation in a city beyond the normal service area where TV fans really have to reach out for a usable signal.

A bit of serious thought should bring up two rather obvious methods of attenuating harmonics. The first, of course, is to design the transmitter so that it will generate a minimum of harmonic power. Then, inasmuch as it is impossible to completely eliminate harmonic generation, the next step would be to prevent any that remained from being radiated, by shielding and filtering.

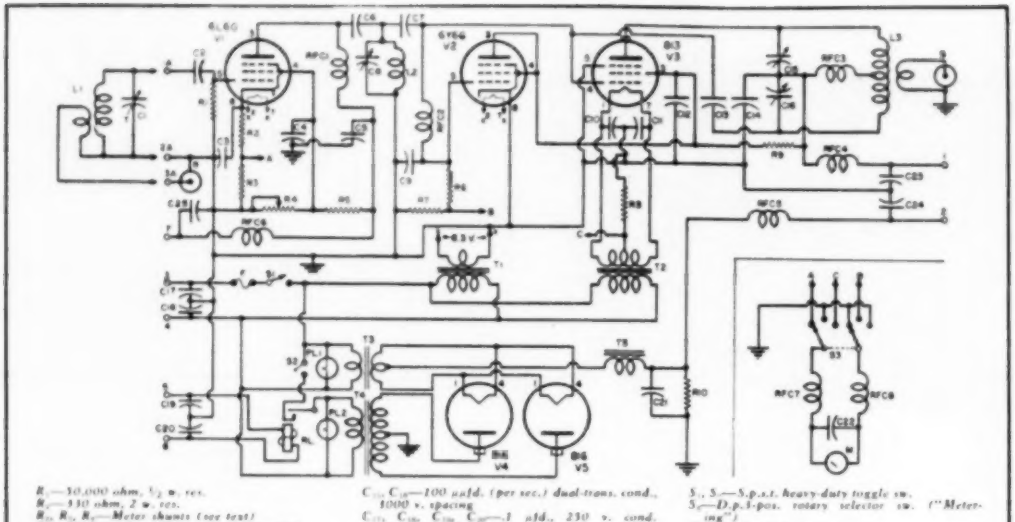
The collected experience of many authorities has shown that harmonic generation can be reduced by several means, such as operating amplifier stages with low driving power; by eliminating circuit resonances which might fall within TV channels; or by accomplishing frequency multiplication in low-power stages.

Keeping harmonic energy from leaving the cabinet entails many mechanical as well as electrical considerations. Radiation can take place from many sources other than the antenna. Radio frequency energy can be carried out of the cabinet on power or control leads. It can leak out of louvers, slots, meter holes, and various other locations in a cabinet. The solution, then, would be to completely shield the radio frequency section of the transmitter and to filter all leads leaving this unit. The only outlet for r.f. energy should be through a coaxial lead to the antenna system in which is inserted a low-pass filter having high attenuation to frequencies above 40 mc. This applies, of course, to transmitters operating below 30 mc.

Inasmuch as the purpose of this article is to consider the elimination of television interference, we will dwell, for the most part, on the design and construction of the radio frequency section of the transmitter. The audio portion will be covered briefly for those interested in constructing the complete rig for phone operation.

Two tubes are used in the transmitter, aside from the rectifiers and clamp tube. The final amplifier is a single 813 driven by a 6L6G. This unit was designed to be excited by the three-band v.f.o. which the author described ("A Low-Cost Bandswitching V.F.O.") in the June, 1949, issue of RADIO & TELEVISION NEWS. The exciter delivers power on the 80, 40, and 20 meter bands. Therefore the 6L6 stage can be operated straight-through on these three bands. It becomes a doubler for ten-meter operation. You will note from the circuit that the input terminals are numbered 1A, 2A, and 3A. These correspond to pins on a 4-prong coil form. Coil L_1 is used only on 10 meters when the 6L6 is operating as a doubler. On all other bands a dummy coil form is plugged into the socket. A jumper from 3A to 1A connects the coaxial input directly to the 6L6 grid. Any similar v.f.o. may be used as an exciter. However, it is recommended that it be operated at low power level. A half watt or so is sufficient to drive the 6L6, even with the untuned grid circuit. The v.f.o. should also be adequately shielded.

As was previously mentioned, one way to reduce harmonic generation is to use low driving power. This is accomplished by incorporating an 813 as a final amplifier with its low grid-drive requirements. In addition to this, the driving power can be controlled by means of a variable screen-voltage control in the 6L6 stage, (R_1). This control should be adjusted to the point which gives normal 813 grid current, with the 6L6 plate circuit tuned to resonance, of course.



R_1—50,000 ohm, ½ w. res.
R_2—330 ohm, 2 w. res.
R_3, R_4, R_5—Meter shunts (see text)
R_6—75,000 ohm, 7 w. var. wirewound res. (Mallory E75MP) ("Drive Control")
R_7—25,000 ohm, 10 w. wirewound res.
R_8—10,000 ohm, 10 w. wirewound res.
R_9—25,000 ohm, 100 w. wirewound res.
R_{10}—50,000 ohm, 50 w. wirewound res.
C_1—30 μμfd. ceramic trimmer (inside L_1, used on 10 meters only)
C_2, C_{27}—.001 μfd. disc ceramic cond.
C_3, C_4, C_5, C_6, C_{16}, C_{17}, C_{28}—.005 μfd. disc ceramic cond.
C_7—100 μμfd. tubular ceramic cond.
C_8—100 μμfd. midget var. cond., 1000 v. spacing
C_{15}—.002 μfd. disc ceramic cond.
C_{18}—Neutralizing cond. (see text)
C_{19}—.001 μfd. mica cond., 5000 v. peak
C_{20}, C_{21}—100 μμfd. (per sec.) dual-trans. cond., 1000 v. spacing
C_{22}, C_{23}, C_{24}, C_{25}—.1 μfd., 250 v. cond. ("Sprague "Hypass")
C_{26}—8 μfd., 1500 v. oil-filled cond.
C_{29}—.01 μfd. disc. ceramic cond.
C_{30}, C_{31}—500 μμfd., 5000 v. ceramic cond.
T_1—Fil. trans. 6.3 v. @ 2 amps.
T_2—Fil. trans. 10 v. @ 5 amps.
T_3—Fil trans. 2.5 v. @ 10 amps., 5000 v. insulation
T_4—Plate trans. 1475-0-1475 v. @ 250 ma. (1250 v. d.c.) (Stancor PT8413)
T_5—Filter choke, 12 hy. @ 250 ma.
RFC_1—2.5 mhy., 125 ma. r.f. choke
RFC_2—1 mhy., 125 ma. r.f. choke
RFC_3—1 mhy., 100 ma. r.f. choke
RFC_4, RFC_5, RFC_6, RFC_7, RFC_8—7 mhy. r.f. choke (Ohmite Z50 or equiv.)
F—5 amp. fuse
S_1, S_2—S.p.s.t. heavy-duty toggle sw.
S_3—D.p.5-pos. rotary selector sw. ("Metering")
M—0-25 ma. meter
PL_1—117 v. pilot light (green)
PL_2—117 v. pilot light (red)
RL—S.p.s.t., 117 v. relay, a.c. coil
L_1—12 t. #22 en. wire, ½" long, 1" dia. 30 μμfd. ceramic trimmer mounted inside form. (Coil used only when 6L6G is functioning as a doubler from 20 to 10 meters)
L_2—80 m.—½" #24 en., closewound 1" dia.; 40 m.—½" #22 en., closewound 1" dia.; 20 m.—10 t. #22 en., ½" long, 1" dia.; 10 m.—6 t. #22 en., ½" long, 1" dia.
L_3—B & W BVL series coils or equiv.
V_1—6L6G tube
V_2—6Y6G tube
V_3—813 tube
V_4, V_5—816 tube

Circuit diagram of the 250-watt transmitter. The terminal connections are: 1 and 2—high voltage to modulator (connect with jumper for c.w.); 3 and 4—117 v. a.c. supply; 5 and 6—remote control voltage, 117 v. a.c.; 7—300 v. d.c. (6L6G plate and screen supply); 8—r.f. input from v.f.o. (coaxial connector); and 9—r.f. output (coaxial connector).

In the interest of stability, the 813 is neutralized. The tube can be operated without neutralization, but not always with complete satisfaction. A 6Y6 clamp tube is used to simplify bias requirements and to prevent damage to the 813 when excitation is removed.

A look at the circuit will show that all leads which leave the cabinet are well filtered. Control and a.c. supply leads are filtered by *Sprague* "Hypass" condensers while all other leads are filtered with v.h.f. chokes and bypass condensers. Radio frequency power enters and leaves the unit through coaxial connectors.

The high-voltage supply, which utilizes a pair of 816 tubes as rectifiers, is an integral part of the r.f. unit. This is not a necessary feature as far as TVI-proofing is concerned, but it did permit the writer to install the rig in a small cabinet which was available.

Metering of the circuits, 6L6 plate current, and 813 grid and cathode current are accomplished with one meter, in conjunction with a selector switch. The meter in this case is one having a 25 milliampere scale. Shunts are adjusted so that the readings are multiplied by 10 for the 6L6 plate, by 1 for the 813 grid, and by 20 for the 813 cathode current. It should be remembered that in the 813 filament return position the meter will read screen and control grid current as well as plate current. Actual plate current, then, will run about 50 ma. less than the actual meter indication under normal operating conditions. This slight disadvantage could be eliminated by using a separate meter in the plate lead, but the system shown has advantages from an economy standpoint and it also simplifies the filtering job. It will be noted from the circuit that the meter leads are filtered and bypassed. In addition, the back of the meter itself is shielded to prevent r.f. leaks from the cabinet at this point. When calculating shunts for the meter, the resistance of the chokes must be included in the total. As the resistance of various meters differs, no attempt will be made here to give exact figures on the shunts. The resistance of meter shunts may be calculated by dividing the meter resistance by the scale multiplying factor minus one. As an example, if it is desired to multiply the scale reading by ten, the resistance of the meter should be divided by 10 minus 1, or 9, to find the value of the shunt.

Screen voltage for the 813 is obtained by the dropping-resistor method in this case, though it can be secured from other sources if desired. The buffer stage requires a plate voltage of about 360. In the author's rig the 6L6 is supplied from a surplus voltage available from the speech amplifier.

Before we go into a discussion of the actual construction, let's take a look at the photos. The top view was taken with the top of the shield box removed. Along the back of the chassis are located the plate transformer, 816 rectifiers, filter choke, and filter condenser. Directly in front of the power supply is the 813 final amplifier which is mounted horizontally with its socket mounted on a bracket fabricated from sheet aluminum. Tube manufacturers recommend that when tubes are mounted horizontally the plane of the plate should be vertical. Screen and filament bypass condensers are connected directly between socket pins and the nearest socket mounting screws. An L-shaped vertical shield separates the input and output circuits. On the left side of the shield are located the 6L6, driver tank circuit, 813 socket, L_3 socket, and 6Y6 clamper tube. On the right are the 813 tank components, meter, and selector switch. A round, close-fitting copper shield encloses the meter.

The 813 neutralizing condenser, which is mounted on the right hand side of the vertical shield, is very sim-

ple. Two small, flat metal strips, ¾ by ¾ inch in size, mounted on stand-off insulators, form the plates of the condenser. Variation of capacity is accomplished by swinging the strips away from each other.

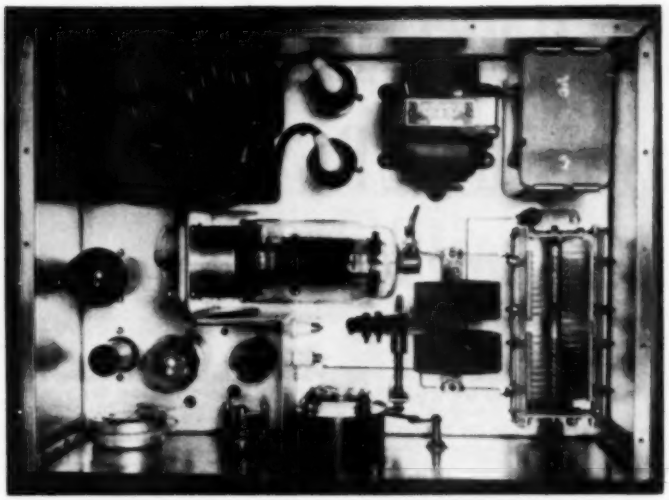
Controls on the front panel are as follows: Drive control (R_1), 6L6 plate tuning condenser, meter selector switch, variable link control, and final tank condenser. Below are the filament switch, filament pilot light, plate pilot light, and plate switch. Of interest is the method of controlling link coupling in the final tank. In order to preserve front-panel symmetry, a simple lever system was used to couple the variable link shaft to its control knob.

Location of all sub-chassis components can be ascertained by inspection of the photograph. Filament transformers, *Sprague* "Hypass" condensers, and bleeder resistors are all located under the chassis, along with other small parts.

The transmitter is mounted on an aluminum chassis, 17 x 12 x 3 inches in size, with an aluminum panel 19 x 8¾ inches. The top of the unit is completely enclosed with a shield box constructed of 16-gauge sheet aluminum. Aluminum angle stock is used in the corners to which the sides and top are bolted with 6-32 brass screws at intervals of about 2 inches, providing good contact along all edges. It is very important that there be no cracks at any of the joints, otherwise radio frequency energy is likely to leak out. Both the top of the box and the bottom of the chassis are covered with 17 x 12-inch aluminum sheets. A removable cover in the top of the shield box facilitates changing of coils and tubes. A series of one-inch holes in the lid, covered with copper screen, permits adequate ventilation while preserving the shielding properties. At first it was planned to use a hinged cover, but as no full-length hinge was immediately available the job was done with thumb screws.

After all sheet metal work was completed, the aluminum was placed in a lye bath. This treatment removes finger prints and light scratches, and at the same time gives a very nice satin finish which tends to resist further blemishes. The front of the panel was given a coat of enamel, but aside from that, the balance of the unit was left bare to permit full contact along all joints. It might be well to mention, in connection with the painting of aluminum, that a coat of zinc chromate primer is recommended over the bare metal.

There are no unusual features about the mounting of parts except the location of TVI filters. Chokes and bypass condensers should be mounted as close as possible to the point where the leads being filtered leave the chassis. If this is not possible, then the leads should be shielded between the filter and the point of exit. Condenser leads should be as short as possible, and the new ceramics are much superior to paper or mica condensers.



Top view of transmitter with shield box removed. Along the back of the chassis are the plate transformer; 816 rectifiers; filter choke; and filter condenser. Directly in front of the power supply is the 813 final amplifier mounted horizontally and the L-shaped vertical shield. To the left of the shield are the 6L6; the driver tank circuit; 813 socket; L1 socket; and 6Y6 clamper tube. On the right are the 813 tank components; meter; and the selector switch.

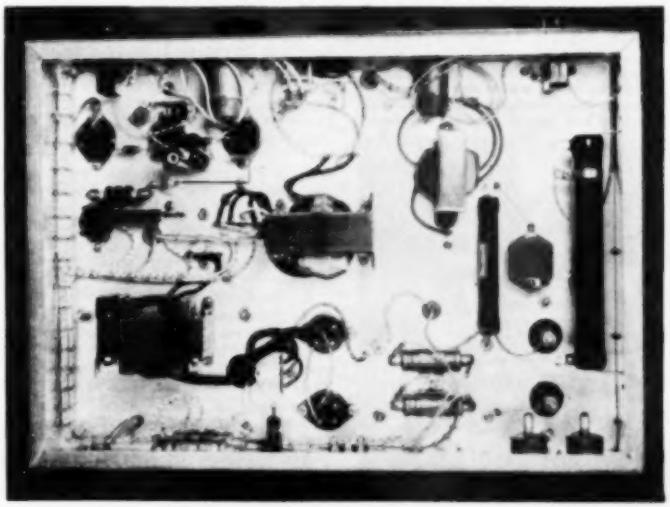
After all major parts were mounted, the unit was wired. All leads carrying 60-cycle alternating current or direct current were cabled and run around in the corners of the chassis. This not only improves the looks but it keeps these leads out of strong r.f. fields. All leads which carry radio frequency current (except coaxial runs) were run direct. Fairly heavy, solid wire is best for r.f. hookup. Bypass condensers were connected directly from the associated tube elements to the nearest socket mounting screw with a solder lug. Coupling condensers, resistors, and the like were mounted on bakelite lug strips in the low-voltage circuits.

When all wiring was completed, the circuit was checked with an ohmmeter as a precaution against possible errors.

The first operating checks were

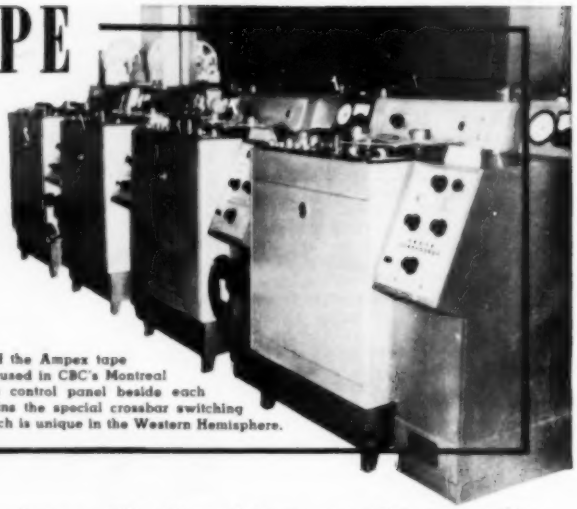
(*Continued on page* 149)

Under-chassis view of unit showing the filament transformers; the "Hypass" condensers; bleeder resistors; and other small components which are used in circuit.



MAGNETIC TAPE and the CBC

By
LEON A. WORTMAN
Director of Adv. & Sales Promotion
Audio & Video Products Corporation



Partial view of the Ampex tape recorder bank used in CBC's Montreal operation. The control panel beside each recorder contains the special crossbar switching equipment which is unique in the Western Hemisphere.

The maximum utilization of tape recordings permits the Canadian Broadcasting Corp. to service its many networks from coast-to-coast as well as overseas.

BECAUSE it hasn't been publicized to any great extent, few of us realize the important role which the *Canadian Broadcasting Corporation* has played in the professional acceptance of magnetic recording. *CBC* began to use magnetic recording as early as 1934, probably making it the first studio tape recording installation of its kind in North America. In order to more fully appreciate the *CBC's* problems and their magnetic tape solutions, it would be well to understand its organization and operation more completely.

Patterned after the *BBC*, the *CBC* is the sole radio network operator in Canada. By the Canadian Broadcasting Act of 1936 (amended in 1951), the *CBC* operates three distinct networks:

The Trans-Canada Network is composed of 16 *CBC* stations and 29 private stations with the key station, CBL, located in Toronto, Ontario. This network operates 18 hours a day and covers Canada all the way from St. Johns, Newfoundland to Vancouver, British Columbia. Operated simultaneously with these AM stations are 4 *CBC* and 9 private FM transmitters.

The Dominion Network is composed of 1 *CBC* station and 47 private stations with the key station CJBC located in Toronto, Ontario. This network operates between 4 and 6 hours a day and covers Canada from Halifax, Nova Scotia to Victoria, British Columbia. Twelve FM transmitters, associated with 12 of the private stations, are operated simultaneously.

The French Network is composed of 3 *CBC* stations and 12 private stations with the key station CBF located in Montreal, Quebec. It operates 17 hours a day and covers the Province of Quebec, portions of neighboring provinces, and border states of the United States of America.

Present plans call for a second French Network to provide service in the same areas as the Trans-Canada and the Dominion Network.

To service these networks, the *CBC* operates seventeen studio plants, eight 50-kw. stations, four 10-kw. stations, five 1-kw. stations, two 250-watt stations, one 100-watt station, and twenty-seven 20-watt repeater transmitters. The repeaters are located in the central communities in the Province of British Columbia, Ontario, and New Brunswick. The network repeaters are located at points where receiving conditions are poor. Broadcast service is thus made available to those communities through the small 20-watt transmitters.

At Sackville, New Brunswick, the *CBC* operates an International Short-wave Service. This consists of two 50-kw. transmitters which are licensed to operate on 17 different frequencies. They utilize 13 antenna arrays, 11 of which are of the curtain variety, equipped with slewing and reversing facilities to alter their beams as required to achieve the desired coverage.

The *CBC* broadcasts for the Domestic Service (Trans-Canada, Dominion, and French Networks) are primarily for a Canadian population of fifteen million people, but are heard satisfactorily in all northern states of the U.S.A. The International Short-wave Service broadcasts in 15 languages.

It was a rare, bold step in 1934 for the *CBC* to install magnetic recording. There was very little precedent for such a move in early commercial and government radio services, when, in the Fall of that year, the *Marconi-Stille-Blattnerphone* "Steel Tape Recording and Reproducing System" was ordered. The tape was wound on a large cast aluminum spool about 20" in diameter. The tape was 0.00325" (3¼ mils) thick and 0.118" wide. Tape speed was maintained at 90-meters per minute (54" per second) and the spools contained sufficient tape to permit a quarter-hour of voice or music to be recorded. A spool of tape for this machine costs slightly over $100.00.

During the latter part of World War II, wire recorders were furnished *CBC's* overseas reporters and early in 1946, *General Electric* Models 50 and 51 and *Brush* BK-303 magnetic wire recorders were placed in operation in the larger studio plants. In 1947 and 1948, *Brush* Model BK-401 semi-professional magnetic tape recorders were introduced.

Practically all of the studio recordings made prior to 1949 were on discs.

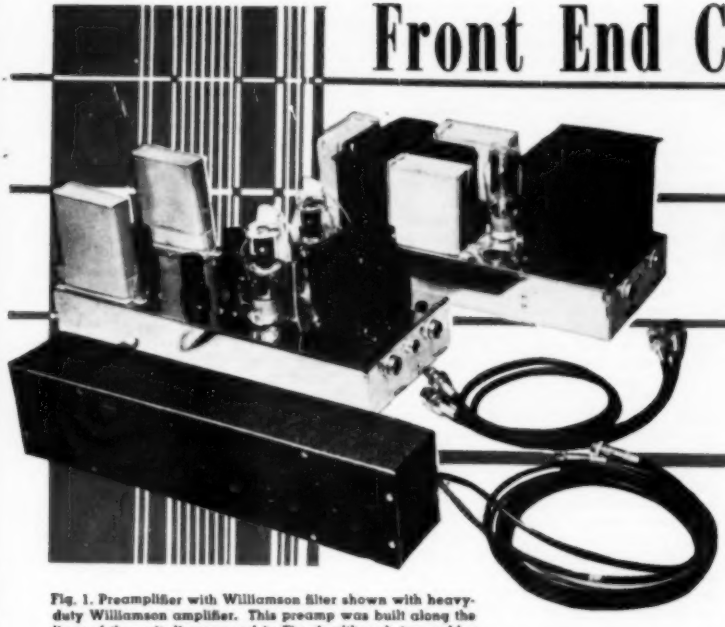
The first modern studio tape recording installation at *CBC* went into service on October 12, 1949 at the Winnipeg studios. This installation consisted of three channels of rack mounted recorder-reproducers. These units were installed to help carry the delayed broadcast load. This load is

(*Continued on page* 84)

Close-up view of the recording equipment. The control panel selects any of 58 input channels. These machines can be remotely controlled from any of 39 studio locations.



Front End Control Unit for Williamson Amplifier



By
ARTHUR J. ROSE

Fig. 1. Preamplifier with Williamson filter shown with heavy-duty Williamson amplifier. This preamp was built along the lines of the unit diagrammed in Fig. 4, although two cables are used here. Cabinet measures 3" x 4" x 17". Amplifier in background has 300 ma. power supply for stable 450 v. required. Lower rated supplies restrict bass output.

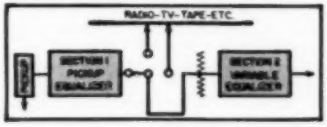
Preamplifiers—covering complete design details on two well-engineered units along with important points to consider when building your own preamp.

AN INHERENT disadvantage of triode output stages is actually put to work in the equalizer-preamplifiers to be described. Although the units are designed for use with the Williamson amplifier and contain some of D.T.N. Williamson's circuitry, they will perform equally well with many other final amplifiers. Variations will be outlined and the individual can choose the particular combination that best suits him. Each has the same features that provide equalization for all types of recordings and other program material. Distortion is not added in any perceivable degree to the over-all system.

Equalizers must provide a lot of bass boost. A recording properly equalized for its low-frequency, constant-amplitude characteristic and for hearing losses may require as much as 40 db of bass boost. 40 db more are required to increase the level of a magnetic cartridge output to drive the final amplifier. This brings the total voltage gain to 10,000. Obviously, it is very easy to introduce hum with such a system. Elaborate precautions are necessary and it is almost impossible to eliminate this disturbance by conventional means. Even a few microvolts of hum admitted into the initial stages of a high gain amplifier will be audible by the time it reaches the speaker. The usual compromise is either to accept the hum or settle for lower gain. In addition, instability at low frequencies prevails with high gain. However, that malfunction is easier to cure. A well-designed decoupling network will eliminate tendencies towards instability and motorboating.

Hum is most commonly admitted through the heaters or heater wiring. Power supply ripple needn't be considered because it is a fairly simple matter to reduce ripple to a fraction of a per-cent. When considering an equalizer with high gain, the surest way to avoid grief is to keep the unit completely isolated from all hum sources. By operating the heaters with d.c., hum is virtually eliminated and 99% of the precautions that usually have to be taken can be disregarded. Heater leads need not be twisted and carefully dressed. Grid and plate leads can be long and unshielded. In fact, the designer can place parts and wiring for the most pleasing appearance and ease of construction.

Fig. 2. Block diagram showing basic arrangement of the various preamplifier sections.



Triodes are notorious for their large current drain. At best they are inefficient. In spite of this, the superlative results obtained with circuits such as the Williamson keeps them popular. The triode-connected KT-66's, 807's, or 5881's used in that amplifier draw about 120 ma. of the smoothest d.c. that can be supplied. Advantage is taken of the large drain by diverting it to the filaments of the preamplifier tubes. There is no need for a separate rectifier and the advantages of d.c. heaters are easily realized. Any tube with a 150 ma. heater can be used.

All is not yet golden. Once hum has been wiped out, an unpleasant "rushing" noise remains. There is only one way to eliminate this particular enemy of high gain amplifiers and that is to use wirewound resistors in all plate and unbypassed cathode circuits. All that now remains is tube thermal noise in the form of high frequency hiss. Its magnitude varies slightly from tube to tube, but substantial reduction of this disturbance is accomplished only at the expense of bandwidth or gain. Fortunately, tube hiss is not objectionable enough to warrant the elaborate procedures necessary for its elimination.

Schematics for two preamplifiers are shown in Figs. 4 and 9. They are cut to the barest essentials and are trouble-free. Each unit is in two sections (Fig. 2): fixed equalization de-

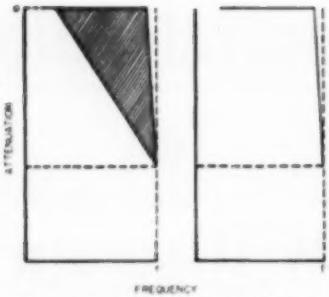


Fig. 3. Comparison of slow and sharp rates of attenuation for noise filters. For an equivalent amount of attenuation at some particular frequency, f, the sharp cut-off version is the more desirable one.

termined by the recording and type of pickup, and variable equalization to alter the flat response to suit the listener. The major difference between the units is the type and location of the scratch suppressor.

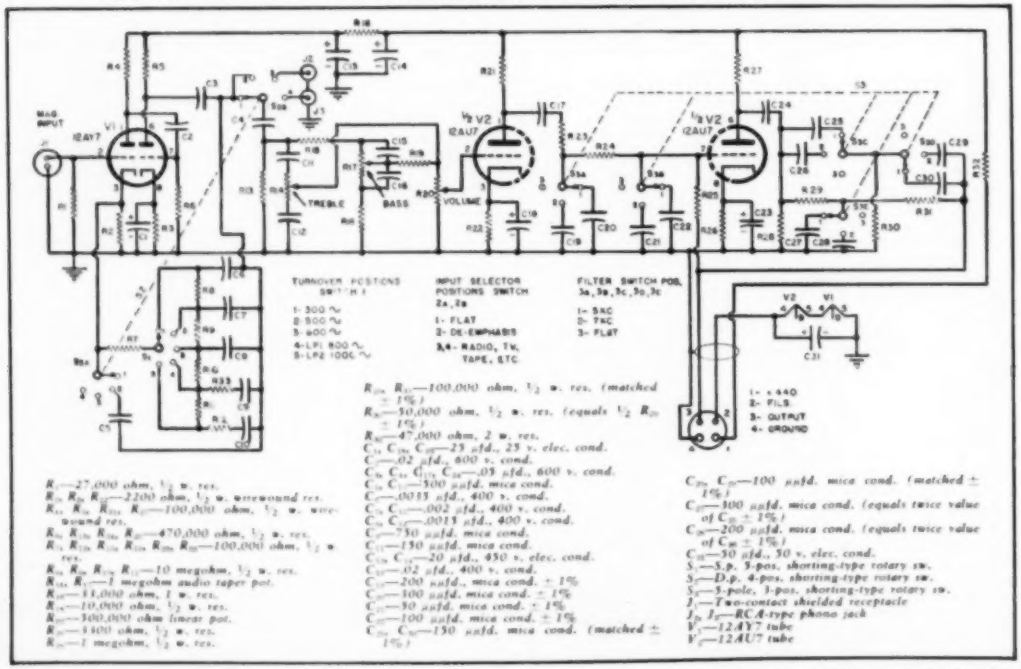
The first section incorporates a 6 db-per-octave boost below a selection of turnover frequencies for constant velocity pickups such as the *Pickering, G-E, Audax*, etc. For constant amplitude pickups such as the *Pfanstiehl* "Strain Sensitive," the reader is referred to the manufacturer's literature regarding proper equalization for the particular cartridge. If the use of such a unit is contemplated, it will be necessary to substitute the recommended circuit for the first sections given in this article. In addition to fixed boost, a de-emphasis network can be included in the first section although it is not mandatory. De-emphasis can be provided later on as will be described. As an extra refinement, a boost in over-all gain can be provided to compensate for the lower output of Microgroove recordings. This is worked into the turnover selector switch as a special *LP* position.

Following the low-level pickup equalizer section, further equalization is necessary to accommodate hearing differences at various volume levels. This accommodation is necessary to overcome scale distortion—a form of distortion due to the fact that the playback is generally at a different volume than the original. Consequently, the frequency response is altered to match the ear response at the playback level to the response it has at the original level. The necessary compensation is determined by the *differences* of response and proper application is dictated by the nature of the material being reproduced. For example, a symphony played at medium room volume requires a fair degree of bass and treble boost while a performance of lower intensity, such as a piano solo played at the same volume as the symphony, requires considerably less boost because the playback level is close to the original. Voice requires droop in many instances where it is reproduced above natural volume.

It appears then that a flexible system that will alter the bass and treble response for *any* setting of the volume control will best accommodate a wide variety of program material. The familiar "loudness" control offers only one degree of fixed boost for any given sound level. While this type of control offers perfect compensation for music of originally loud proportions where the response of the ear is nearly flat, it falls short where accurate reproduction of less intense material is required. It is totally unsuitable for louder-than-original playback. Bass and treble compensation systems employed in the second section consist of infinitely variable boost and droop. A modification to boost only is satisfactory as bass droop is almost never used in playback and treble droop is used only rarely. Turnover frequencies are based on average hearing curves similar to those derived by Fletcher and Munson. A channel selector precedes this section and a volume control is inserted in the grid circuit.

Finally, because noisy records are often encountered, some form of scratch filter must be considered. The extent of circuit elaboration for the removal of record hash is limited only by individual resources. Schemes have been devised ranging from simple treble attenuators to complex variable bandpass filters. Success of each is determined by the amount of highs that remain or *apparently* remain after the scratch is eliminated. Excellent results have been obtained with high-frequency cut-offs between 20 and 60

Fig. 4. Complete schematic diagram of a preamplifier using a Williamson filter and including boost-droop controls.



R_{1a}, R_{1b}—100,000 ohm, ½ w. res. (matched ± 1%)
R_{2a}—50,000 ohm, ½ w. res. (equals ½ R_{1a} ± 1%)
R_{2b}—47,000 ohm, 2 w. res.
C_{1a} C_{1b}—25 μfd., 25 v. elec. cond.
C_{2a}—.02 μfd., 600 v. cond.
C_{2b} C_{2c} C_{2d}—.05 μfd., 600 v. cond.
C_{3a} C_{3b}—500 μμfd. mica cond.
C_{3c}—.0033 μfd., 400 v. cond.
C_{4a} C_{4b}—.002 μfd., 400 v. cond.
C_{4c} C_{4d}—.0015 μfd., 400 v. cond.
C_{5a}—750 μμfd. mica cond.
C_{5b}—150 μμfd. mica cond.
C_{6a} C_{6b}—20 μfd., 450 v. elec. cond.
C_{7a}—.02 μfd., 400 v. cond.
C_{7b}—200 μμfd., mica cond. ± 1%
C_{8a}—300 μμfd. mica cond. ± 1%
C_{8b}—50 μμfd. mica cond. ± 1%
C_{9a}—100 μμfd. mica cond. ± 1%
C_{9b} C_{9c}—150 μμfd. mica cond. (matched ± 1%)
C_{9p} C_{9t}—100 μμfd. mica cond. (matched ± 1%)
C_{9x}—300 μμfd. mica cond. (equals twice value of C_{9p} ± 1%)
C_{9y}—200 μμfd. mica cond. (equals twice value of C_{9t} ± 1%)
C_{10}—50 μfd., 50 v. elec. cond.
S_1—S.p. 5-pos. shorting-type rotary sw.
S_2—D.p. 4-pos. shorting-type rotary sw.
S_3—5-pole, 3-pos. shorting-type rotary sw.
J_1—Two-contact shielded receptacle
J_2 J_3—RCA-type phono jack
V_1—12AY7 tube
V_2—12AU7 tube

R_1—27,000 ohm, ½ w. res.
R_2 R_3 R_4—2200 ohm, ½ w. wirewound res.
R_5 R_6 R_{7a} R_{7b}—100,000 ohm, ½ w. wirewound res.
R_8 R_{9a} R_{9b} R_{9c}—470,000 ohm, ½ w. res.
R_{10a} R_{10b} R_{10c} R_{10d}—100,000 ohm, ½ w. res.
R_{11} R_{12} R_{13} R_{14}—10 megohm, ½ w. res.
R_{15}—1 megohm audio taper pot.
R_{16}—33,000 ohm, 1 w. res.
R_{17}—10,000 ohm, ½ w. res.
R_{18}—500,000 ohm linear pot.
R_{19}—1400 ohm, ½ w. res.
R_{20}—1 megohm, ½ w. res.

db-per-octave. A comparison of the response curves of Fig. 3 will illustrate why sharp cuts yield better results. With a majority of recordings, scratch predominates above some particular frequency. There is no need to attenuate below that frequency. To do so would destroy brilliance unnecessarily and result in a muddy sound that is as undesirable as the scratch. Removal of scratch starts with 6 db attenuation. That much will give an indication that something is being done. Actually, effective removal requires a much greater cut. It is reasonable to assume that the sharp rate of attenuation will cut frequencies in the noise range without removing those below. A slower rate will attenuate as much in the desired region, but the cut has to have a much greater "head start." The shaded area illustrated in Fig. 3 shows the unnecessary loss of high frequencies with a slow rate of attenuation.

Preamplifiers built by the author have included cuts ranging from 20 to 60 db-per-octave with increasing effectiveness. The simpler type of filter giving about 20 db-per-octave is the familiar *RC* shunt across the magnetic cartridge. Filters such as these are merely *LC* low-pass filters with the "*Q*" lowered by the addition of the shunt resistor to smooth out the peak. The inductance is furnished by the pickup coil and calculations are based on "*Q*'s" from .8 to 1 to determine the correct resistor to use.

A more complex, but exceedingly effective, filter giving attenuations starting at 40 db-per-octave and rapidly turning to 60 db-per-octave, is based on the parallel-T network. In essence, this circuit takes the very narrow bandpass characteristic of the parallel-T (Fig. 6A) and removes the upper pass region by the application of negative feedback via a phase-shifting network. The result is the sharp cut-off, low-pass filter of Fig. 6B. This configuration is described in detail elsewhere by D. T. N. Williamson.[1] The author has simplified the arrangement to three-position switching and adapted it to American tubes. Experience has shown that additional cut-offs above 7 kc. are unwarranted. Because of its location in the preamplifier unit, this filter may be used on broadcast programs—a boon to the long suffering listeners of noisy records and transcriptions from FM stations.

For constructors who desire the ultimate in preamplifiers, the choice of the unit with the Williamson filter is recommended. For those who want an excellent unit, but do not believe that their present equipment demands the refinements of a more ambitious undertaking, the other preamplifier is suggested. Parts of the units may be interchanged. For example, the variable bass and treble sections are equally good and are adaptable to either preamplifier. The simpler circuit shows boost only, while the more elaborate unit is shown with "center position flat" boost-droop controls. If the constructor feels that droop will never be used, then the straight boost type is to be preferred since a finer adjustment can be effected with full pot. rotation. Front end refinements may also be used in the simpler unit. These include a de-emphasis switch and the special *LP* positions in the turnover switch.

While the selection of parts for these units is perhaps more arduous than ordinarily required, the ensuing construction need only be a subdivision of methods commonly termed "straightforward." Wirewound resistors must be used where indicated. Do not use the metallic film type resistor as they give almost as much noise as carbons. It is necessary to match several resistors and condensers closely for the Williamson filter. Their absolute values may be within 10% of those listed, but they must be within 1% of each other. Within the housing of the units, no special techniques are required. However, the entire preamplifier must be fully enclosed in a metal box.

When choosing components for your unit, take advantage of the many miniatures now offered, such as "Discaps," for values up to .02 mfd., "Aerolites" and other very small condensers from .02 up, and "Ceramicons" for low values in the filter circuit. Small wirewound resistors in the 100,000 range are made by *Shallcross* and *IRC* as precision resistors. They can be purchased from surplus for very little as odd values, *e.g.*, 112,300 ohms. Accuracy is not important here. Resistances below 10,000 ohms are available wirewound in the standard form as type BW.

Heater supply connections for the Williamson output stage are shown in Fig. 7. Note that only a three-wire shielded cable is needed from the amplifier to the preamplifier with this arrangement. This connection can be

(*Continued on page* 112)

[1] "Design of Tone Controls and Auxiliary Gramophone Circuits," *Wireless World*, Oct.-Nov. 1949.

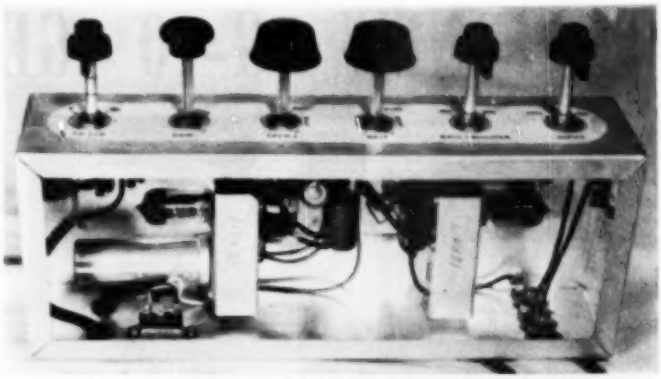


Fig. 5. Close-up view of preamp of Figs. 1 and 4. Coaxial cable is used for the output and two-wire lamp cord is employed for "B+" and heater supply.

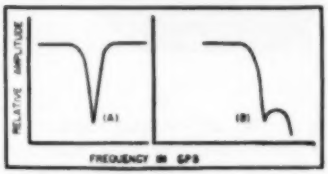


Fig. 6. Typical parallel-T narrow bandpass characteristic (A) transformed into low-pass filter and (B) by application of a negative feedback through the network.

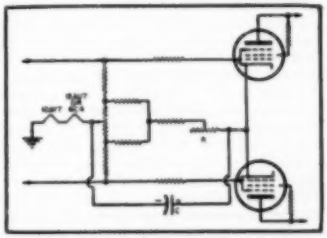
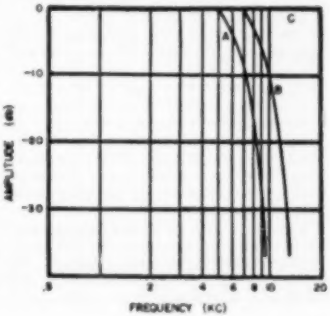


Fig. 7. Method of obtaining heater current from Williamson output stage. Adjustment of R affects tube drain and should be set for proper heater operation. Cathode bypass, C, is returned to center arm of balance pot. for stability and protection in event of an open in filament string.

Fig. 8. Williamson filter positions. (A) at 5 kc., (B) at 7 kc., and (C) flat.



THE NEW G-10 GERMANIUM DOT RECTIFIER

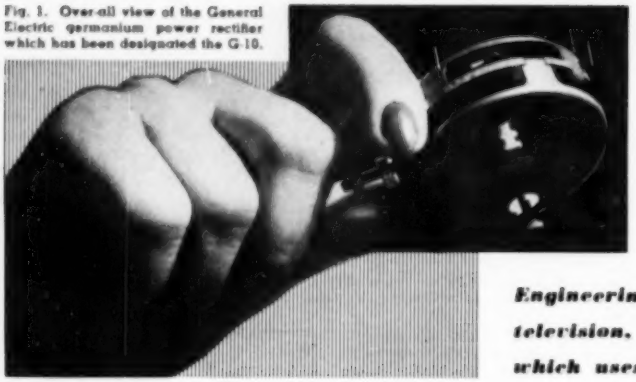


Fig. 1. Over-all view of the General Electric germanium power rectifier which has been designated the G-10.

Engineering data on a new unit for radio, television, and allied power applications which uses no critically-short materials.

By
T. J. FERGUSON
Crystal Eng. Sec., Comm. & Gov't. Equip. Dept.
Electronics Div., General Electric Company

GENERAL Electric Company has long been aware of the important characteristics that make germanium rectifiers superior to other types of rectifiers. These characteristics are their lower forward resistance, higher back resistance, longer life expectancy, and reliability. The advantageous characteristics of the germanium diode plus the techniques for increasing the area of the rectifying surface, developed by the *General Electric* Research Laboratories, have been responsible for a germanium rectifier that could be used in television, radio, and allied power supply applications. The *G-E* Germanium Dot Rectifier, designated G-10, having these characteristics, grew out of this investigation. In addition, it was found commercially feasible to manufacture the Germanium Dot Rectifier without the use of critical materials.

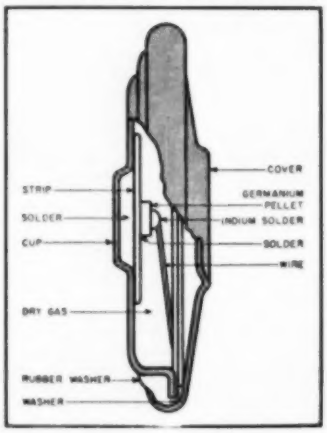
The G-10 is composed of two "button" rectifiers, each consisting of a $\frac{1}{8}$ square inch pellet of spectroscopically pure germanium placed in the center of metal cups sealed with butyl rubber, as shown in Fig. 2. These rectifiers are series mounted on two inch diameter, $\frac{1}{32}$ inch thick metal dissipating fins. A high coefficient of thermal conductivity is the governing qualification for the choice of metal used in the dissipating fins. Copper and aluminum have been successfully used. Production units will probably use aluminum dissipating fins.

Rectifiers are stabilized electrically by 24 hours of operation at full load. This stabilization serves to remove the remaining gaseous impurities from the rectifying surface and to relieve any mechanical strains within the button due to changes of temperature with operation.

In order to insure an equal division of the peak back voltages across series-connected rectifiers, it was found necessary to use units with the same dynamic back currents. Any increase in temperature results in an increased back current. There are two factors that vary from rectifier to rectifier that must be considered when selecting rectifiers for their inverse currents. The first is the heat generated by the currents in the forward and back resistance. The second is determined by the thermal characteristics of the contact between the rectifier and the dissipating fin.

Both of these factors can be evaluated simultaneously by applying full forward current during the selection test. Therefore, the rectifiers are sorted with respect to their dynamic back currents at the full rated load. This sorting and selection is done at the factory, hence the finished products are electrically stable and only a very slight change occurs in the inverse current during the life of the rectifier.

Fig. 2. Cross-section view of one of the "button" rectifiers used in the G-10 assembly.



To further insure that mismatched, damaged, or otherwise defective units are not shipped to customers, the completed rectifiers are checked under maximum operating conditions for forty-eight hours at 130 volts a.c., 350 ma., and 55°C. This results in an extremely efficient rectifier that does not change its electrical characteristics significantly with time.

Fig. 3 shows the static characteristics of an average G-10 taken at different ambient temperatures. The rather rapid increase in inverse current at the higher temperature tends to place an upper limit on the useful temperature range of the Germanium Dot Rectifier. This upper limit is believed to be inherent in most semi-conductor devices, as it is thought that inverse currents are largely generated by thermal agitation at the rectifying surface.

Fig. 4 shows the static resistance, at room temperature, for an average G-10. It is of interest to note that the rated peak-to-peak voltage of the G-10 (400 volts) falls on or near the point of maximum resistance of the Germanium Dot Rectifier at room temperature.

In many circuits the efficiency of this unit is at least 98%. For example, with a 50-watt resistive load, the power dissipated within the rectifier as heat is usually less than 1 watt. Operation at 50°C does not materially affect this efficiency. Other types of rectifiers may lose as much as 5% of their room temperature efficiency at 50°C.

Another advantage of this rectifier is the low effective capacity, usually

about 20 μfd.; making it possible to operate dry disc type power supplies from 25 cycles to about 50 kilocycles. This characteristic is of particular advantage in lightweight installations, such as aircraft and mobile power units. Here a high frequency alternator with a G-10 rectifier and a small filter will provide low noise and ripple content d.c. power over wide extremes of temperature, vibration, and altitude.

The life expectancy of the Germanium Dot Rectifier is believed to be well in excess of 10,000 hours at full load and 40°C. At the present time, several units have been on test for more than 4000 hours at full load, at 40°C with no significant changes in their electrical characteristics. This figure has been limited only by a lack of time in which to take the test to completion.

Some typical characteristics for the Germanium Dot Rectifier with various filter condensers at room temperature are shown in Figs. 5 and 6 for two types of rectifier circuits. An average selenium rectifier is shown for comparison. It will be noted that the slope of the curve is mainly a characteristic of the size of the condensers used, but that the efficiency of the rectifier determines the position of the curve.

A doubler circuit has been successfully used at temperatures as high as 90° C ambient with the characteristics as shown in Table 1.

Excessive overload in the half-wave circuit, or the voltage doubler circuit, generally causes the rectifier to short-circuit. This usually opens a series fuse or surge resistor and damages the rectifier irreparably. If this occurs, there is no disagreeable odor from the G-10 as is often the case with other type rectifiers.

The recommended surge or current limiting resistance has been tentatively established at the same values used with selenium rectifiers, i.e., approximately 5 ohms. There is some indication, however, that this may be reduced to approximately half of this value. Even at 5 ohms, the series condenser ripple-current ratings must be increased to prevent condenser damage, due to the higher surge and ripple currents that result from the lower forward resistance of the Germanium Dot Rectifier.

The Germanium Dot Rectifier is not seriously deteriorated by humidity due to the butyl rubber sealed metal case; several test units have successfully completed 50 or more cycles of operation under maximum load conditions at 90% to 95% relative humidity. Each cycle consists of two periods of four hours of rectifier operation separated by an eight hour period of inactivity.

Additional research is underway to improve the accuracy of tests and to provide a faster and more complete stabilization, together with operation at higher temperature ambients and current ratings than are presently possible. —30—

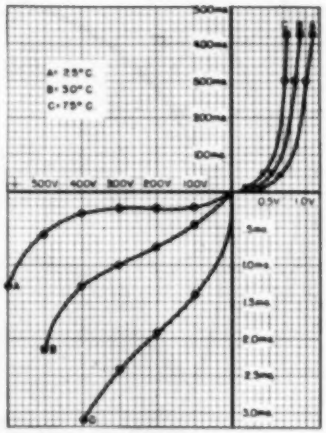


Fig. 3. Static characteristics of an average G-10 taken at different ambient temperatures ranging from 25 to 75 degrees C.

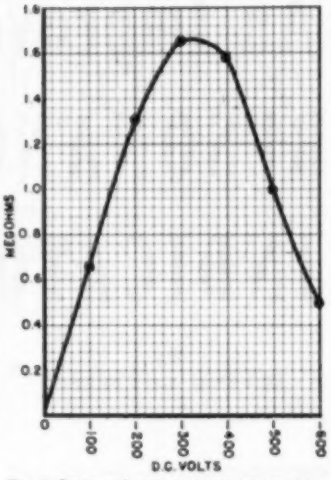


Fig. 4. Static resistance at room temperature.

Degrees (C) maximum free-flowing air temperature	90
Milliamperes maximum average forward current	100
Amperes maximum forward surge current	5
Maximum voltage (peak-inverse-voltage)	70
A.C. voltage input	27
D.C. voltage output	55
D.C. current output (in milliamperes)	100
Filter capacitance in μfd.	150
Series surge resistor in ohms	5
Approximate load resistance in ohms	550

Table 1. G-10 characteristics in a doubler circuit at ambient temperatures to 90° C.

AMBIENT TEMPERATURE	25°C to 40°C	55°C	65°C
RMS input voltage	130	130	130
RMS current	1.2 amps.	1.3 amps.	.8 amps.
D.C. output current	400 ma.	350 ma.	50 ma.
D.C. surge current	25 amps.	20 amps.	2.5 amps.
Peak forward current	3 amps.	3 amps.	.5 amps.
Peak inverse voltage	400	400	400
Max. full load voltage drop	1.5	1.4	1.3
Operating frequency	50 kc.	50 kc.	50 kc.

Table 2. Tentative electrical characteristics for the G-10 Germanium Dot Rectifier.

Fig. 5. Some typical characteristics for the G-10 in condenser-input power circuit.

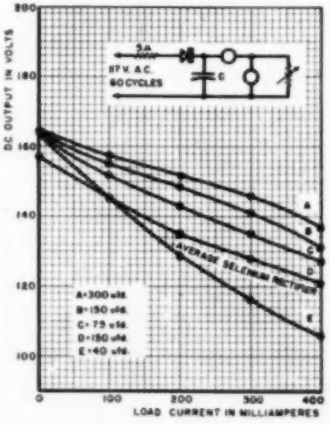
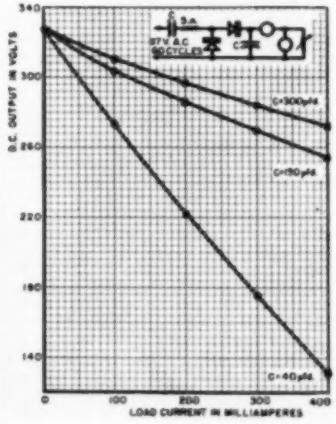
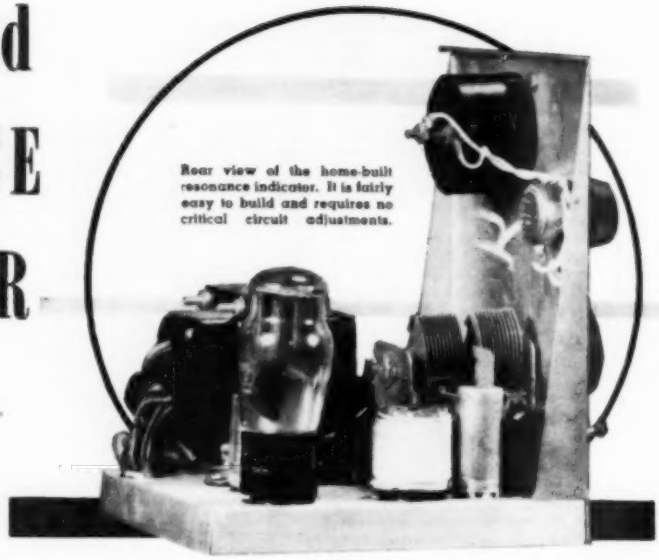


Fig. 6. Performance graph of the G-10 when used in a conventional doubler circuit.



An Improved RESONANCE INDICATOR

By
IRVING GOTTLIEB



Rear view of the home-built resonance indicator. It is fairly easy to build and requires no critical circuit adjustments.

Details on a unit which serves the purpose of a grid dip meter but is entirely free from meter variation. It covers from 3.1 to 31 megacycles.

THE status of the grid dip resonance meter as an indispensable adjunct to the well-equipped electronic laboratory has persevered since the early days in the radio art. The esteem bestowed upon this instrument by the radio fraternity stems from the appreciation of a simple and rapid means of bridging the gap between theoretical computation and practical results in the construction of apparatus using radio frequency resonant circuits. The calculation of the resonant frequency of a coil-condenser combination is always somewhat indeterminate due to unknown factors such as stray capacitance, stray inductive coupling, lead inductance, and tuning slug permeability. A device which permits measurement of actual resonance as produced by the cumulative effect of all stray parameters is indeed a useful one. The grid dip meter performs this function; however anyone who has used the commercial versions of this instrument is aware that ofttimes considerable caution must be exercised to prevent masking of a weak resonance by the meter needle which drifts as the instrument is tuned. A resonance indicating device which indicates only the establishment of resonance, and which is devoid of indicator fluctuations due to its internal characteristics would constitute a definite improvement over the time-honored grid dip meter. The instrument to be described has been devised by the author to serve the purpose of the grid dip meter but without the annoyance of the meter variation.

Although it is possible to design oscillator circuits so that reasonably constant grid current will be maintained over wide frequency excursions, the author believes the approach depicted in the schematic diagram of Fig. 1 is a much better one. The indictator needle remains at zero until the *LC* circuit undergoing measurement is resonated, whereupon a deflection takes place. The principle of operation can best be grasped by first considering the plate circuit of the 12AU7 tube. Assuming for the moment that the circuit parameters of both triodes of this tube are identical, a sensitive meter will not detect any potential difference when connected from plate to plate. Regardless of the value of the respective plate currents, the fact that they are the same and that these currents flow through identical circuits prohibits any potential difference between the two plates. This operating condition should be readily accepted before proceeding further. Perhaps a little more light is cast on the nature of this portion of the circuit by stating that the 12AU7 is operated very much like a push-pull class C r.f. amplifier tuned considerably off-resonance. Although a class C amplifier operating under such circumstances would draw heavy current from the power supply, no difference in d.c. potential would exist from plate-to-plate providing the circuit was a balanced one. Furthermore, no difference in plate-to-plate potential would result from variation of grid excitation. A step further in our consideration of the analogous class C amplifier reveals that it makes no difference whether the grids are driven in- or out-of-phase insofar as the existence of d.c. potential from plate-to-plate is concerned. No r.f. energy will be delivered to the plate loads in either case by virtue of the specified off-resonance tuning adjustment. *Only an unbalance in the push-pull circuit will allow the development of a d.c. potential from plate-to-plate.*

Returning now to Fig. 1, the 12AU7 should actually be considered a class C amplifier with plates in push-pull and grids in parallel. The equivalent of off-resonant operation exists for any frequency because the plates are heavily bypassed to ground. Attention should now be focused upon the cathode circuits of the 12AU7. Both cathodes contain equal resistances to limit the plate currents to a safe value since plate circuit resonance is not used to achieve such a condition. Also, both cathodes contain 15 inch lengths of coaxial cable terminated by small link-type coils. There is one difference in the physical symmetry of the push-pull circuit at this point; one coaxial cable is coiled up and permanently secured to the underside of the chassis, whereas the other coaxial cable is brought out through the panel and is used with its pickup link in exploring the *LC* combination to be measured. This situation does not

Table 1. Winding data for L_1, L_2, and L_3.

L_1—3.1 to 5.2 mc.—30 t.; 5.4 to 8.5 mc.—13 t.; 9.7 to 13.6 mc.—6 t.; 13.9 to 22.5 mc.—3 t.; 23.0 to 31.0 mc.—2 t. All coils closewound of #20 plastic covered solid hook-up wire on 1⅛" dia. form. The form is cemented over the outer dia. of 6V6 tube bases or bases from other tube types with similar dimensions. Pins 1 and 5 are used for the coil connections.
L_2, L_3—15" length of RG-59/U coaxial cable. These cables are terminated by a two-turn coil of stiff wire with a diameter of 1". One cable is brought out from the panel and its pickup coil is coupled to the LC circuit undergoing measurement. The other cable is coiled beneath the chassis and is included just for the sake of circuit balance.

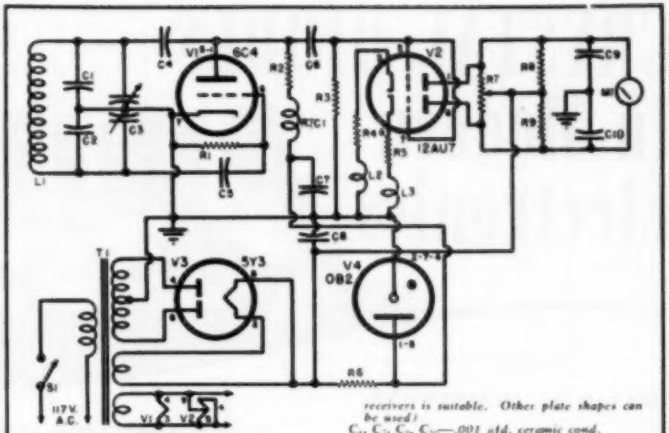
cause electrical unbalance except in one special case. (A coaxial cable may be stretched taut or wound in a coil without altering its characteristics.) The special case is that in which the r.f. energy in the pickup link is identical in frequency with the resonant frequency of the nearby *LC* circuit. Let us now analyze why this is so.

The proximity of a resonant *LC* combination to the pickup loop extracts energy from the loop and thereby decreases the r.f. drive to the input of the triode section associated with the pickup loop. This triode section now draws less plate current than the other triode section, the grid drive of which has not been affected. The plate of the affected tube assumes a positive potential with respect to that of the other plate. This is so because the diminished plate current of the affected tube allows a higher plate voltage to exist at its plate than in the case of the unaffected tube. With both tube sections the respective plate voltage equals the difference between power supply voltage and the *IR* drop in the plate-load resistances. Consequently, a d.c. meter will read zero voltage from plate-to-plate when the circuit is balanced. When a state of asymmetry is produced in the grid drive by proximity of a resonant circuit to the pickup loop, the d.c. meter will indicate the resultant potential difference in the plate circuits.

So far nothing has been mentioned concerning the oscillator. Its function is simply to cover the desired frequency range and to furnish sufficient drive to the 12AU7 so that the grid circuits of that tube operate as would be the case in a conventional class C amplifier. Other than this, it is not required that the output level of the oscillator remain constant with respect to frequency. A simple Colpitts oscillator designed around a 6C4 proved quite satisfactory. It was found necessary to provide a substantial amount of minimum capacitance in order to eliminate unstable performance at the high frequency end of the tuning range. This applies to all frequency ranges and the solution consists of the addition of the small condensers C_1-C_3. The trimmer condensers should be physically removed from the tuning condenser if they are present; their presence is not conducive to stability of frequency calibration. The plate supply voltage to the 6C4 is regulated so that line voltage variations will not appreciably affect frequency calibration. The effect of R_5 on plate voltage regulation to the 6C4 is negligible. Coil winding data is given in Table 1 to allow continuous coverage from 3.1 to 31 megacycles, thereby encompassing the popular amateur bands.

Higher or lower frequency coils can be wound as desired. In the case of the frequencies above 31 mc., there will be one "dead spot" corresponding to the frequency at which the coaxial cables resonate with the pickup loops. In this particular design, the dead spot is approximately 36 mc., well beyond the highest frequency covered. The dead spot can be shifted to the vicinity of 70 mc. by using shorter coaxial ca-

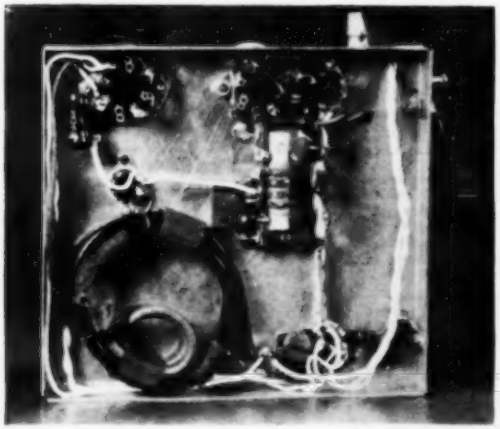
(*Continued on page 144*)



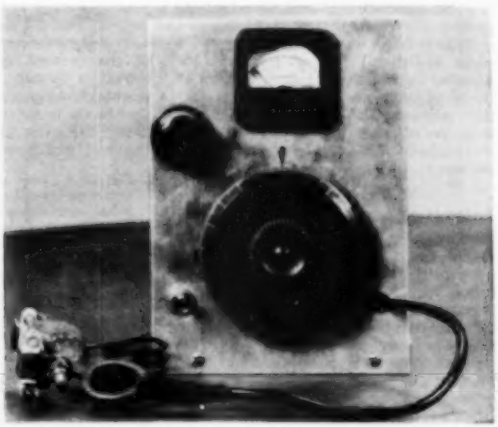
R_1—22,000 ohm, 1 w. res.
R_2—2200 ohm, 1 w. res.
R_3—10,000 ohm, 1 w. res.
R_4, R_5—330 ohm, 1 w. res. (These two resistors should be selected by means of ohmmeter measurement for identical resistance)
R_6—5000 ohm, 5 w. wirewound res.
R_7—250,000 ohm carbon pot.
R_8, R_9—10,000 ohm, 1 w. res. (These two resistors should be selected by means of ohmmeter measurement for identical resistance)
C_1, C_2—39 μfd. ceramic or mica cond. (These are in addition to the trimmer condensers)
C_3—350/350 μfd. dual-gang, straight-line var. cond. (Type commonly found in small b.c. receivers is suitable. Other plate shapes can be used)
C_4, C_5, C_6, C_7—.001 μfd. ceramic cond.
C_8—270 μμfd. ceramic cond.
C_9—50 μμfd. ceramic cond.
C_{10}—8 μfd., 450 v. elec. cond.
T_1—Power trans. 340-0-340 v. @ 70 ma.; 6.3 v. @ 2.5 amps; 5 v. @ 2 amps.
RFC—2.5 mhy. r.f. choke
M—0-.5 ma. or 0-1 v. d.c. meter. The basic movement of many milliammeters and voltmeters consists of 0-.5 ma. or even more sensitive meters
S_1—S.p.s.t. switch
V_1—6C4 tube
V_2—12AU7 tube (select for matched sections)
V_3—5Y3 tube
V_4—OB2 tube

Fig. 1. Complete schematic diagram and parts list covering the resonance indicator.

Underchassis view of unit. See text for data on coax cable.

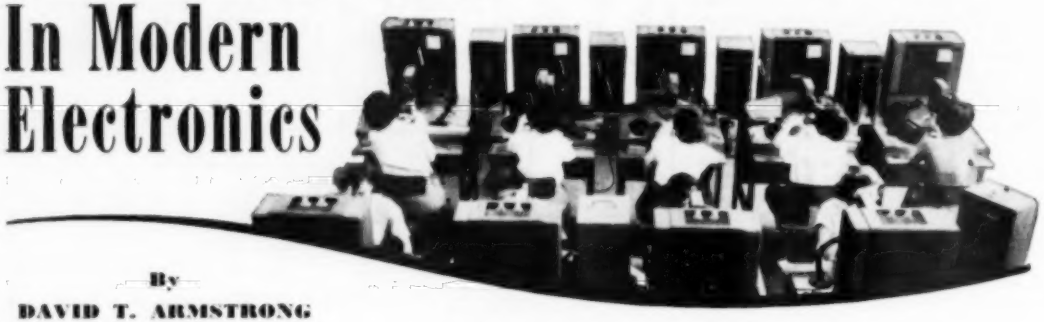


Front panel view of the compact resonance indicator unit.



CRYSTAL DIODES In Modern Electronics

Several banks of catwhisker machines at the General Electric Clyde, N. Y. plant. The factory's production is devoted exclusively to the manufacture of germanium products for industry.



By
DAVID T. ARMSTRONG

Part 8. Concluding article of this series covers a.f.c. sync circuits and a.g.c. in video receivers.

THE triggering of the impulse generator in a TV receiver is susceptible to interference from certain types of impulse noise. Under ideal conditions the scanning generators of a typical TV receiver provide high quality synchronization; but they provide comparatively poor performance in areas where there is high amplitude impulse noise.

Horizontal scanning circuits are particularly susceptible to noise pulses slightly greater in amplitude than the peak video intelligence level, particularly when such pulses occur near the end of a scanned line, where the impulse generator is sensitive to triggering. See Fig. 1.

It is true that certain types of video amplifiers provide some noise limiting, but conventional sync circuits can not differentiate between a normal sync pulse and a random noise pulse, particularly:

1. When the random pulse is of the same polarity as the sync pulse.
2. When the random pulse is of sufficient amplitude to pass through the separator circuits.
3. When the noise pulse occurs at that part of the scanned line where the impulse generator is sensitive to triggering.

Thus it becomes desirable to provide some additional control for synchronization in addition to direct action of the sync pulse on the impulse generator because high amplitude random noise pulses near the "front porch" of the horizontal sync pulse may tear the picture.

Indirect Control

While such additional control may be imposed upon a scanning system directly or indirectly, the simple and economical circuits are of the indirect type. The indirect method of control is based upon the repetition frequency of a large number of successive sync pulses rather than upon individual pulses. There is a continuous comparison for phase and repetition frequency of sync pulses with the waveform of the local oscillator scanning system; there is also the development of an "error voltage" proportional either to a phase or frequency difference between the compared sets of sync pulses.

This error voltage is applied to correct the frequency of the local oscillator and is similar in many ways to a.f.c. circuits for FM and AM. Because horizontal phase comparators do not make use of tuned circuits, they are not critical to adjust, nor are critical components required.

There is no limitation on the type of impulse generator used in the scanning system, as it may be: the clipped sine wave type; the multivibrator type; any of the blocking oscillator types; or any type capable of being controlled for frequency by a variable reactance or resistance tube.

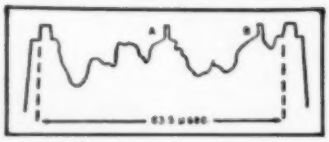
The control circuit must be adapted to the particular oscillator used and should be so designed that it effects a smooth variation of the oscillator frequency over approximately ±10% of the nominal oscillator frequency.

The Phase Comparator

The phase comparator is the heart of the control system; this may be either a phase discriminator or a double diode combining circuit. In the double diode circuits it is common to apply the sync pulse out-of-phase to the two diodes with the locally generated sweep voltage applied in-phase. Irrespective of which type circuit is used, a d.c. voltage proportional to the phase or the frequency difference of the applied voltage must be developed. It is also necessary to insure that the polarity of this d.c. voltage be such as to react properly whether the frequency of the local oscillator is above or below that of the sync pulse repetition frequency; this is important, but not difficult to attain.

Basically, a.f.c. sync control circuits maintain some small constant frequency or phase difference between sync pulses and local oscillator pulses. This small difference provides a control voltage which holds the oscillator to the desired frequency. Fig. 2 shows a typical a.f.c. sync circuit designed to be used with a blocking oscillator type impulse generator.

Fig. 1. A noise pulse occurring at A would not trip pulse generator, but a noise pulse occurring at B, when pulse generator is just ready for triggering, would be quite likely to trigger the generator prematurely and cause deterioration of image on the cathode-ray tube screen.



A.F.C. With Blocking Oscillator

V_1 is the blocking oscillator tube with its associated transformer T_1. The frequency controlling elements are C_8, R_8, and R_{10}. V_2 is a medium-mu triode operating as a d.c. amplifier of the a.f.c. control voltage developed by the phase comparator germanium diodes, CR_1 and CR_2. The amplified d.c. voltage variations appear as changes in the d.c. plate voltage of V_2; these appear as grid bias changes of the sweep oscillator V_1. These changes in grid bias are reflected as changes in frequency of the sweep oscillator V_1.

Potentiometer R_7 is a fine frequency control which should be adjusted to approximately the correct frequency; the action of the a.f.c. circuit corrects the oscillator under all conditions of operation when the frequency of the oscillator is ±10% of the sync pulse repetition frequency.

The inverse feedback network C_7 and R_7 makes V_2 relatively unresponsive to changes in grid voltage which occur at a rate faster than approximately 0.5 second. Triode V_3 is a phase inverter

to supply the 180 degree phase difference between the sync pulses at the input of the phase comparator. The locally generated sweep impulse is derived from the plate of the blocking oscillator triode through the wave shaper network, C_{10} and the 8200 ohm resistor.

The operation of the phase comparator circuit is such that when locally-generated pulses lag or lead the sync pulses one of the diodes passes more current than the other. This produces a voltage across the common load resistor R_5. The polarity of this voltage is determined by the direction of phase shift and the magnitude of voltage is proportional to the phase shift. The correction necessary to shift the frequency of the oscillator is provided in the grid bias of V_2.

This type circuit has much to recommend it. It is quite simple and contains relatively few components; it affords reliable synchronization over a rather wide frequency range; the d.c. amplifier is practically unresponsive to variations in control voltage; the performance of this circuit in the presence of impulse noise is excellent; and, synchronization remains steady under noise conditions that mask out the picture. The use of germanium diodes eliminates diode contact potential effects which may unbalance the system and show up in a slow drift in the operating point of the d.c. amplifier.

Sine-Wave Oscillator and A.F.C.

Blocking oscillator and multivibrator impulse generators are unstable as the supply voltage changes. A stabilized sine-wave oscillator possesses all the virtues and none of the defects of these oscillators; when combined with a suitable wave shaping network, it lends itself nicely to a.f.c. circuits. The discriminator reactance tube combination has proved itself in performance; a circuit of a grounded-plate Hartley oscillator is shown in Fig. 4.

V_1 is a sine wave oscillator pentode. V_1 oscillates violently at some frequency determined by the resonant frequency of the inductance. The plate current swings to cut-off during the most negative portion of the cycle, and a clipped sine wave appears across the plate load resistor R_4. C_5 and R_7 differentiate the clipped sine wave and a positive impulse appears at the output of the network. This is the impulse that may be used to control a discharge tube.

V_2 is a nigh mutual conductance pentode connected as a variable inductive reactance across the oscillator tank circuit. The oscillator frequency is controlled by the d.c. bias on the grid of V_2. This d.c. bias is provided by the germanium diode phase discriminator consisting of CR_1 and CR_2, the transformer T_1, and the associated circuit components.

The out-of-phase components of the oscillator voltage are derived from the tuned balanced secondary winding of T_1; the primary of T_1 is the oscillator tank inductance. The network C_{12} and

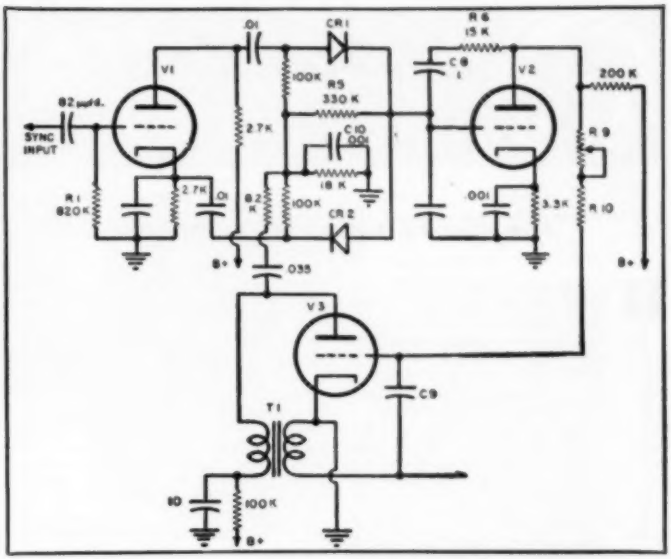


Fig. 2. Circuit of a.f.c. sync with horizontal blocking oscillator. CR_1 and CR_2 may be either 1N34's or 1N48's. V_1 is the phase inverter, V_2 a d.c. amplifier, and V_3 is a blocking oscillator. The crystals perform the function of a horizontal phase detector and a comparator in this particular television circuit.

R_{10}, together with C_{11}, is an integrator network to keep rapid changes in the control voltage, derived from the discriminator, from affecting the reactance tube bias. This permits the reactance tube to follow only the average changes in control voltage.

Horizontal Phase Detector

A commercial application of this control circuit is shown in Fig. 3. The clipped sync pulses are direct coupled to the grid of the triode vertical sync amplifier. This also serves as a phase inverter for horizontal pulses. The output of this phase inverter provides

(*Continued on page* 108)

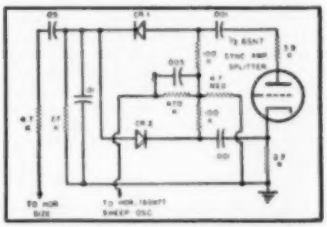
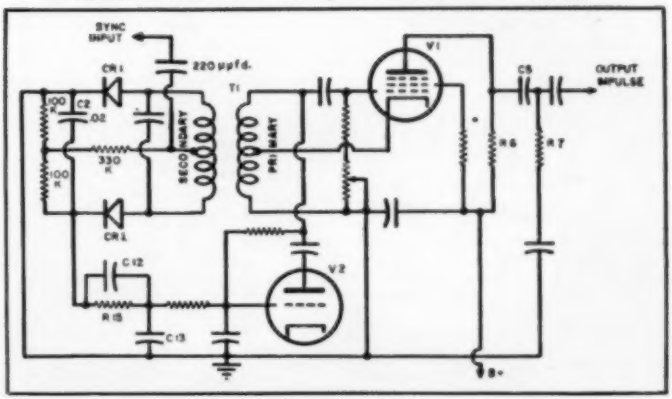
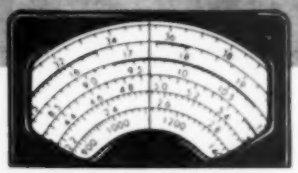


Fig. 3. Horizontal phase detector and comparator. CR_1 and CR_2 are 1N64 crystal diodes. This particular circuit is used by Mack Industries in its television chassis No. 9018 and illustrates the theory discussed.

Fig. 4. An a.f.c. sync circuit with a stabilized sine-wave oscillator. This is a grounded-plate Hartley oscillator. V_1 is a sine-wave oscillator pentode, V_2 is a reactance tube, and CR_1 and CR_2 may be either 1N34's or 1N48 type crystals.



International SHORT-WAVE



Compiled by **KENNETH R. BOORD**

BY THE time you read this, the *Voice of America* should be broadcasting from the high seas.

The United States Coast Guard Cutter *Courier*—first of a potential fleet of sea-going radio broadcasting stations of *VOA*—was recently commissioned in ceremonies attended by members of Congress, top government officials, and civic leaders. This radio flagship, carrying its "Cargo of Truth" and the most powerful transmitters ever installed on a vessel, is the first of a proposed fleet of *VOA* "Truth Ships."

Following an initial trip to the Nation's capital for inspection by President Truman, a shakedown cruise to the Caribbean, and a period of testing, the *Courier* was to begin her task of frustrating jamming by operating as closely as possible to target audiences, thus covering vast areas of the "Iron Curtain" countries beyond the reach of *VOA*'s present medium-wave broadcasting equipment. The "Truth Ship" adds new mobility to *VOA*'s present world-wide radio network in broadcasting 50 program hours daily in 46 languages and dialects.

The vessel carries a 150 kw. medium-wave transmitter (three times as powerful as the largest American commercial medium-wave broadcasting station); two 35 kw. *short-wave* transmitters; supporting communication equipment; Diesel engines capable of generating 1,500,000 watts of electrical power for the radio equipment; permanent *short-wave* antennas atop the forward deck; captive barrage balloon—65 by 35 feet—with a capacity of 150,000 cubic feet of helium, to float 900 feet in the air to support the medium-wave antennas. The vessel also may broadcast from land-based antennas.

The floating relay base is a former Navy cargo vessel, 5800 tons, 338 feet; it was de-mothballed and transferred first to the Department of State, then to the Coast Guard.

Commanded by Captain Oscar C. B. Wey, United States Coast Guard, the *Courier* is manned by a Coast Guard crew of 10 officers and 80 men, plus three *VOA* radio engineers to supervise the operation of the transmitting equipment.

Although the "Truth Ship" can originate and broadcast programs from the open sea—flying her antennas from the helium-filled captive balloon—she is scheduled to anchor at strategic ports to relay programs broadcast from *VOA*'s New York studios. Her mobility allows the *Courier* to shift from place to place on short notice—to more ably serve the *Voice*'s purpose where most needed.

Conceived by *VOA* engineers, the project was approved by President Truman, the Joint Chiefs of Staffs, and the Congress. It was developed by leading American scientists, technicians, ship builders, and Coast Guard officers under the direction of George Q. Herrick, *VOA*'s chief engineer, and Jean Seymour, project engineer.

At the commissioning ceremonies, Dr. Wilson Compton, Administrator of the International Information Administration which operates *VOA*, said:

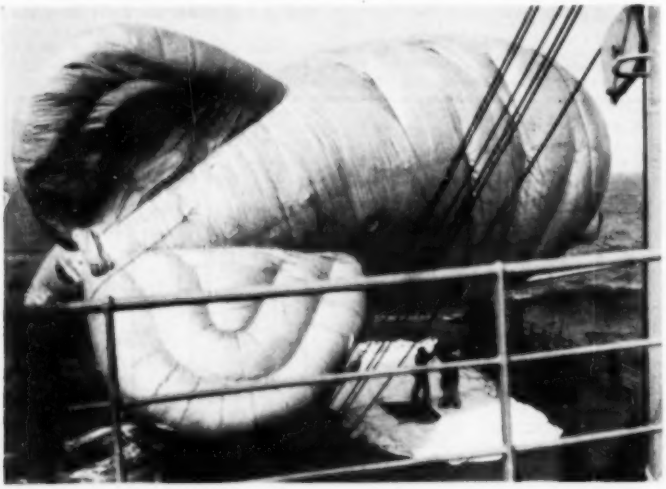
"History demonstrates it is difficult to quarantine ideas. By sending the Courier *with its message of hope and freedom to the seven seas, we aim to show the interest of America in other peoples, and broadcast the precepts of democracy as opposed to the dogmas of totalitarianism. The Coast Guardsmen who sail the ship will be pioneers, setting out for a new kind of beachhead with a new kind of weapon."*

Bon voyage!

* * *

(Note: Unless otherwise indicated, all time is expressed in American EST, add 5 hours for GCT. "News" refers to newscasts in the English language. In order to avoid confusion, the 24 hour clock has been used in designating the times of broadcasts. The hours from midnight until noon are shown as 0000 to 1200 while from 1 p.m. to midnight are shown as 1300 to 2400.) The symbol "V" following a listed frequency indicates "varying." The station may operate either above or below the frequency given. "A" means frequency is approximate.

A captive balloon is used to support the antenna for "Voice of America" broadcasts behind the Iron Curtain. The U. S. Coast Guard Cutter "Courier" has been assigned to "VOA" duty and will cruise Mediterranean waters and off-shore areas near the Iron Curtain. The balloon used to carry the antenna is 69 x 35 feet in size and holds 150,000 cubic feet of helium. It is held by means of a winch-operated line.



This Month's Schedules

Afghanistan—Radio Kabul, 9.975, noted on Sunday opening in *English* 1115; after brief news, had music to 1145A closedown. (Catch, Pearce, England)

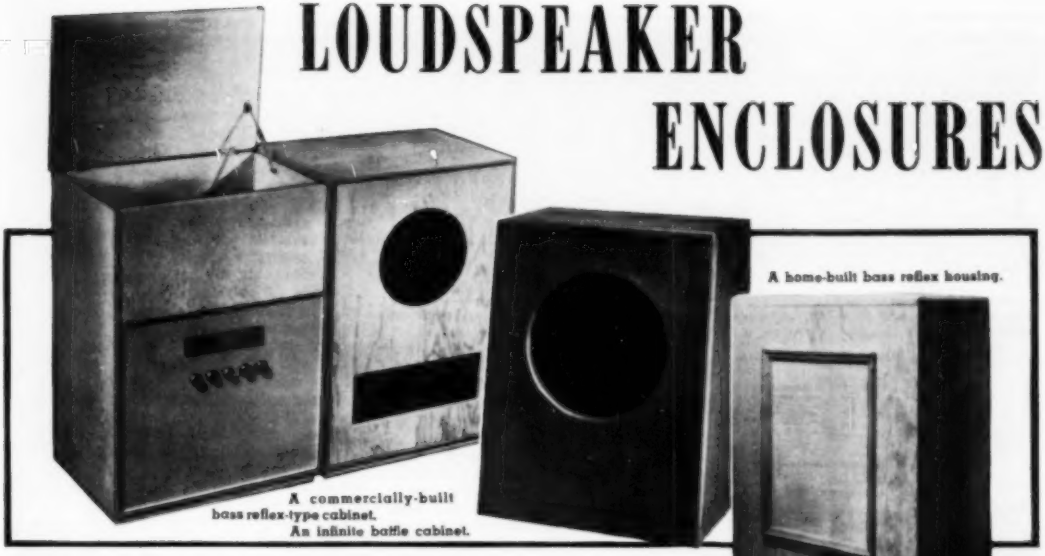
Albania—Shkodra, 8.215, noted in English 1245 with accordion music. (Catch, England)

Algeria—Radio Algerie, 7.280, noted 1650; heard on 6.145 from 1400; believed to close 1745. (Pearce, England)

Angola—Radio Clube de Angola, 11.862, Luanda, is good level in Indiana to 1730 closedown. (Leary) Usually becomes audible before 1500. (Niblack, Ind.) Noted parallel on 9.632 from 1330; faded out around 1600 but presumably closes down 1730 also. (Pearce, England) *Radio Clube de*

(*Continued on page 91*)

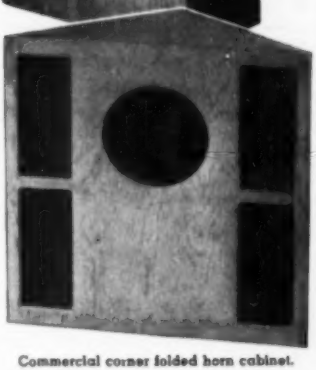
LOUDSPEAKER ENCLOSURES



A commercially-built bass reflex-type cabinet.

An infinite baffle cabinet.

A home-built bass reflex housing.



Commercial corner folded horn cabinet.

By DAVID FIDELMAN

Improve sound reproduction by housing your speaker in a correctly-engineered and properly-built cabinet.

THE most difficult question which faces the high-fidelity enthusiast or the audio experimenter in setting up a high-quality sound reproduction system is what loudspeaker arrangement to use. Unfortunately, there is no simple and easy answer to this question, as the choice of a loudspeaker system depends upon both the amount of money and the effort which can be invested in it.

In reproduction of sound, the loudspeaker is required to produce the same sound which is produced by all the instruments of a large orchestra, over the entire audible frequency range. It is required to project into the air of the listening room low-frequency vibrations identical with those of the large instruments such as the bass viol and the pipe organ, and the high-frequency vibrations of the triangle and the piccolo. The difficulty of accomplishing this function is obvious and most of the improvement which has taken place in the quality of sound reproduction has resulted directly from the improvement in loudspeaker design and manufacture.

The loudspeaker performs its functions as an electromechanical system, and its performance is limited by the wavelength and the amount of air it can move at the low frequencies, and by the mass of the moving parts at the high frequencies. Because of these fundamental difficulties, the quality of the loudspeaker system usually is the major factor which determines the over-all fidelity of any sound reproduction system. The other components of the system can be made to give good performance at a fairly reasonable cost, whereas good loudspeakers are quite expensive. In the design and construction of any sound reproduction system, the loudspeaker which is selected should be the best one which can be afforded, and the necessary expense or effort should be put into the choice of the proper enclosure for the loudspeaker. If the proper attention is thus paid to the loudspeaker system, the effort and expense will be justified by the improvement in over-all sound reproduction quality.

The selection of the loudspeaker itself is primarily a matter of listening to a number of different units in appropriate enclosures, studying the performance specifications supplied by the manufacturer, and making a choice which almost always represents a compromise between individual preferences and expense. Some of the important factors which should be found in a good loudspeaker are:

(*a*) The response should be reasonably flat over a frequency range of 50-10,000 cps.

(*b*) The frequency response curve should be fairly smooth, with as few sharp peaks and dips as possible, since these discontinuities in the curve represent mechanical resonances which result in bad transient response.

(*c*) The power rating of the speaker or speakers used should correspond to the power output of the amplifier and to the requirements of the listening room, so that there will be no distortion at high sound levels. A loudspeaker which has these properties will generally be capable of giving very good sound reproduction when properly baffled and used with a good electronic system.

Once the loudspeaker has been chosen, the question arises as to the type of enclosure in which to mount it. The type of enclosure to be used must be given careful consideration, since good results can be obtained from loudspeakers only when they are properly baffled. This article will describe the most widely used acceptable types of loudspeaker enclosures, and will give dimensions and constructional information that will permit the audio experimenter to construct his own baffle for whatever speaker has been selected. Home construction instead of a purchased commercial baffle has the two advantages for the experimenter that: (*a*) he can select the dimensions and size to suit any special space requirements he may have, and (*b*) the amount of money saved can make

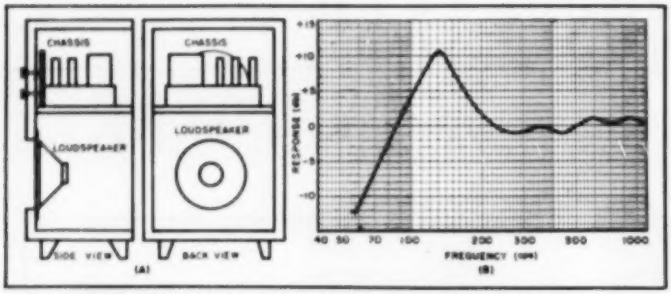


Fig. 1. (A) Method of mounting loudspeaker in conventional open-back cabinet. (B) A typical frequency response curve for a loudspeaker mounted in open-back cabinet.

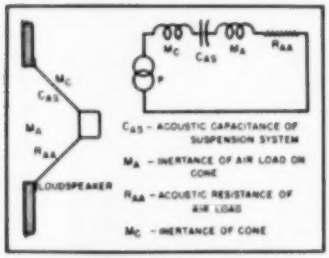


Fig. 2. Equivalent electrical circuit representation of loudspeaker performance.

possible the purchase of a better loudspeaker and result in better reproduction quality.

The reasons for the difficulty in obtaining proper baffling for loudspeakers may not be immediately apparent until it is realized that the primary purpose of the baffle is to prevent sound from the back of the speaker cone (which is 180° out-of-phase with that from the front) from cancelling the sound transmitted from the front of the cone. The smaller the difference in air path compared to the wavelength of the sound, the more complete is the cancellation. Therefore if the loudspeaker is not mounted in a baffle, or is mounted in a very small one, there will be cancellation up to a relatively high frequency and the reproduced sound will be deficient in low frequencies. If the speaker is mounted on a flat board, which is the simplest type of baffle, this board should measure at least 8 feet on each side (with the speaker mounted away from the center) if adequate response is to be obtained below 100 cps.

Because of the large size required if flat boards are used for loudspeaker mountings, a number of different types of baffles have been developed which do not require as much space. Some types perform the additional function of improving the low-frequency response by increasing the coupling between the loudspeaker cone and the air into which the sound is radiated. At low frequencies the area of the loudspeaker becomes insufficient for proper coupling to the air—this is one reason why small loudspeakers are not capable of the same low-frequency response as larger loudspeakers. The enclosures which increase the low-frequency response do so by increasing the area of radiation into the air at low frequencies.

The most common type of housing for loudspeakers is the unsatisfactory conventional open-back cabinet found in almost all commercial radio and radio-phonograph combinations sold at the present time. When the sound path from the back of the cone is sufficiently long (as in the case of the large console cabinets) the low frequencies are reproduced; while in the midget radio cabinets the sound path from the back to the front is very short and the low frequencies are not reproduced because of the out-of-phase cancellation. However, the most objectionable acoustical feature of such cabinets is that the back of the cabinet behind the loudspeaker acts as a resonant enclosure. It is an open-ended resonant tube (such as, for example, an organ pipe) which accentuates the loudspeaker response at the frequency of resonance due to the increased efficiency of the acoustical system. A diagram showing the typical physical layout of such a system is shown in Fig. 1, together with the type of frequency response obtained. The cabinet resonance causes the sharp peak in the response, generally in the range between 100 and 200 cps, which very unfavorably affects the intelligibility and naturalness of the reproduced sound and is especially noticeable in the reproduction of music and male speech. This is the "boomy" quality so characteristic of almost all commercial radio receivers. This open-back construction of the loudspeaker enclosure is used in mass-produced receivers because of its low cost and simplicity of construction, but it should be avoided in any system being set up for high quality reproduction.

The faults of the open-back loudspeaker enclosure can be eliminated by use of a properly designed loudspeaker housing which will give wide-range reproduction of sound with good frequency response and without undesirable peaks. In general, proper design of a housing for best loudspeaker performance consists of incorporating acoustical networks into the cabinet to eliminate the faults of the open-back cabinet and to improve the loudspeaker characteristics.

"Infinite Baffle" Cabinets

The simplest type of loudspeaker cabinet is one with a completely enclosed back. By making the cabinet as rigid as possible and padding the inside with absorbent material, the sound from the back of the loudspeaker cone is completely prevented from reaching the front. Such a cabinet is sometimes known as an "infinite baffle" cabinet, since its effect is similar to mounting the loudspeaker on an infinitely large flat board. However, the volume inside the box must be sufficiently large, or else the low-frequency response will be reduced.

The best way to understand the effect of the enclosure upon the performance of the loudspeaker is to consider the electromechanical equivalent circuits. The electromechanical equivalent circuit of the loudspeaker mounted on an infinitely large flat board is shown in Fig. 2. (It should be understood that this is not the actual electrical circuit of the loudspeaker, but is just an analogy in which its mechanical and acoustical properties are represented by electrical quantities.) Thus the loudspeaker has the same properties as the series *LCR* circuit. It has a resonant frequency above which the sound output is independent of frequency, while it falls off rapidly below resonance.

When the loudspeaker is mounted in an infinite baffle closed box, the volume of the box has the effect of capacity added in series in the circuit, as shown in Fig. 3. A capacity added in series in such a circuit lowers the effective capacity and raises the resonant frequency—and the larger the capacity the less will be this effect of raising the resonant frequency. The cabinet volume should, therefore, be made as large as is conveniently possible, so that it represents a large acoustic capacity and will have a minimum effect upon the resonant frequency of the system.

The constructional details of infinite baffle cabinets for the various types of loudspeakers in common use at the present time are given on the "Data-Print." Typical dimensions are indicated which show minimum volumes for the particular loudspeakers in question. If the space requirements make other dimensions preferable, the same minimum volume should be maintained, although the volume may be decreased slightly if the consequent decrease in low-frequency response is not objectionable.

The size of the cabinet may, of course, be made as great as desired, subject only to practical limitations. The limiting case of this type of cabinet occurs when the loudspeaker is mounted in a door or wall between two different rooms, or between a room and a closet. This method has been used extensively in many installations where the room arrangement permits

(*Continued on page* 55)

GENERAL ELECTRIC SPEAKERS FOR EVERY APPLICATION!

G-E SPEAKERS

CATALOG NUMBER	SIZE (INCHES)	MAGNET WEIGHT (OZS.)	RATING POWER (WATTS)	V.C. IMP. (OHMS)	V.C. DIAMETER (INCHES)	RESONANCE (CYCLES)	RESPONSE (CYCLES)	BAFFLE OPENING (INCHES)	SHIPPING WEIGHT LBS. OZS.
4000	4	1.3	4	3.2	⅝	185	140 to 7,000	3½	10
4020	4	1.0	4	3.2	⅝	185	140 to 7,000	3½	10
4030	4	.68	4	3.2	⅝	185	140 to 7,000	3½	8
5000	5	1.3	4	3.2	⅝	160	125 to 8,000	4¼	12
5030	5	.68	4	3.2	⅝	160	125 to 8,000	4¼	10
5220	5¼	1.3	4	3.2	⅝	160	120 to 7,000	4¼	12
5260	5¼	1.0	4	3.2	⅝	160	120 to 7,000	4¼	12
5270	5¼	.68	4	3.2	⅝	160	120 to 7,000	4¼	12
6350	6½	1.3	4	3.2	⅝	140	110 to 9,000	5⅛	14
6360	6½	1.0	4	3.2	⅝	140	110 to 9,000	5⅛	14
6500	6½	2.98	8	3.2	⅝	150	100 to 10,000	5⅛	1 6
7030	6x9	1.47	8	3.2	⅝	100	70 to 13,000	5⅛x5⅛	1 12
8000	8	2.98	8	3.2	⅝	100	80 to 11,000	6⅞	1 12
8100	8	6.8	12	3.2	1	100	80 to 10,000	6⅞	2 8

CATALOG NUMBER	SIZE (INCHES)	MAGNET WEIGHT (OZS.)	RATING POWER (WATTS)	V.C. IMP. (OHMS)	V.C. DIAMETER (INCHES)	RESONANCE (CYCLES)	RESPONSE (CYCLES)	BAFFLE OPENING (INCHES)	SHIPPING WEIGHT LBS. OZS.
8150	8	6.8	12	8.0	1	100	80 to 10,000	6⅞	2 10
10000	10	6.8	12	3.2	1	75	60 to 7,000	8¾	3 12
10010	10	14.5	25	8.0	1¼	70	60 to 8,000	8¾	5 2
10050	10	9.0	25	8.0	1¼	70	60 to 8,000	8¾	3 14
10120	10	3.16	12	3.2	1	75	60 to 7,000	8¾	3 6
10180	10	6.8	12	8.0	1	75	60 to 7,000	8¾	3 12
12000	12	6.8	12	3.2	1	75	60 to 8,000	10¾	4 12
12010	12	14.5	25	8.0	1¼	70	30 to 13,000	10¾	6 8
12030	12	9.0	25	8.0	1¼	70	30 to 13,000	10¾	3 2
12120	12	3.16	12	3.2	1	70	60 to 8,000	10¾	4 4
12180	12	6.8	12	8.0	1	70	60 to 8,000	10¾	4 8
400C22	4	1.3	4	3.2	⅝	300	160 to 7,000	3½	10
525C18	5¼	1.3	4	3.2	⅝	160	120 to 7,000	4¼	12
		★			★		★		

...AND ALL OF THEM HAVE THESE FEATURES!



★ **Aluminum Voice Coil**—your speaker's best insurance against *moisture* or extremes of temperature.

★ **Alnico 5 Permanent Magnets** help deliver maximum sensitivity.

★ **Plated Finish.** Special chemical treatment protects the luster and effectiveness of metal parts.

★ **All-weld construction**—for rigidity of frame and controlled flux density.

★ **100% inspection of each speaker** (not spot checking!) for electrical and mechanical operation.

GET THIS CHART IN FILE CARD SIZE— FREE!



General Electric Company, Section 962
Electronics Park, Syracuse, New York

Please send me your ready reference speaker chart.

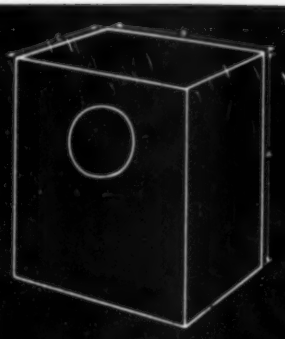
NAME.....

ADDRESS.....

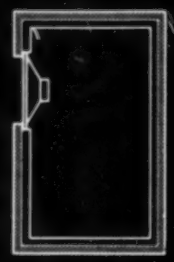
CITY..... STATE.....

GENERAL ELECTRIC

LOUDSPEAKER ENCL



INFINITE BAFFLE CABINET

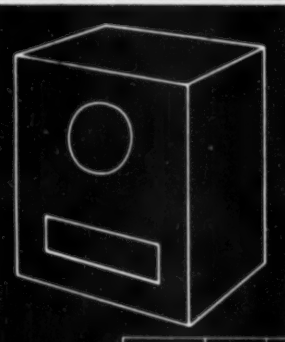




LOUDSPEAKER SIZE	OPENING	OVER ALL CABINET DIMENSIONS A	B	C
8"	6½" diam.	29½"	22"	12"
		Enclosed volume—7800 cu. in.		
10"	8½" diam.	34"	25"	13½"
		Enclosed volume—11500 cu. in.		
12"	10½" diam.	38"	28"	15"
		Enclosed volume—16000 cu. in.		
15"	13¼" diam.	43"	32"	18"
		Enclosed volume—24800 cu. in.		

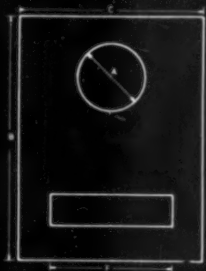
CORN

LOUDSPEAK SIZE
12"
15"

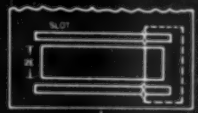


BASS REFLEX CABINET





LOUDSPEAKER SIZE	OPENING A	OVER ALL CABINET DIMENSIONS B	C	D	VENT DIMENSIONS E	F
8"	6½" diam.	23"	17½"	10½"	2"	9¼"
		Enclosed volume—2800 cu. in.			Area—28 sq. in.	
10"	8½" diam.	28½"	22"	12½"	4"	13½"
		Enclosed volume—5700 cu. in.			Area—50 sq. in.	
12"	10½" diam.	34"	28"	14½"	5¼"	16½"
		Enclosed volume—10,000 cu. in.			Area—86 sq. in.	
15"	13¼" diam.	41"	30½"	17½"	7½"	21"
		Enclosed volume—16,200 cu. in.			Area—130 sq. in.	



DETAILS OF THE SLIDING PANEL CONSTRUCTION BY WHICH THE VENT OPENING MAY BE ADJUSTED TO CHANGE THE RESONANT FREQ. OF THE CABINET.

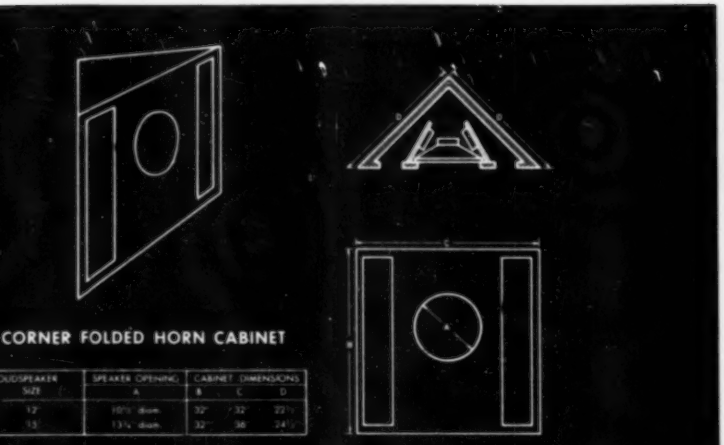


LABYRINT

TYPICAL COMMERCIAL LOUDSPEAKERS

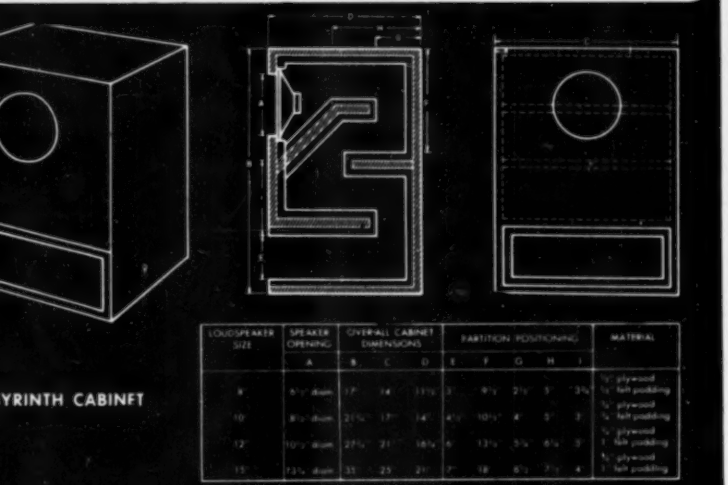
8 Inch	10 Inch	12 Inch
Altec Lansing 4008, 755A	General Electric S1001D	Altec Lansing 6008
Electro-Voice SP8-B	Jensen P10SX	Electro-Voice SP-12, S
General Electric S800D, S810D, S818D	Stephens 100	General Electric S12(
Jensen P8SX	Wharfedale W10CS8, W10CS8/T	Jensen P12SX, K-210
Jim Lansing 208		Jim Lansing D-131
Permoflux 8T-8-1, 8UP-8-1		Permoflux 12T-8-1, 1
University "Diffusicone"		Quam 12A6CO
Utah SP8JW		Stephens P-22FR
Western Electric 755A		University 6201, "Diff
Wharfedale 8 CS, 8" Bronze		Utah SP-12-LW
		Western Electric 728
		Wharfedale W12CS,

LOSURE DESIGN DATA



CORNER FOLDED HORN CABINET

LOUDSPEAKER SIZE	SPEAKER OPENING A	CABINET DIMENSIONS B	C	D
12"	10½" diam.	32"	32"	22½"
15"	13¼" diam.	32"	38"	24½"



YRINTH CABINET

LOUDSPEAKER SIZE	SPEAKER OPENING A	OVERALL CABINET DIMENSIONS B	C	D	PARTITION POSITIONING E	F	G	H	I	MATERIAL
8"	6½" diam.	17"	14"	11½"	3"	9½"	2½"	3"	3¼"	½" plywood ½" felt padding
10"	8½" diam.	21½"	17"	14"	4½"	10½"	4"	3"	3"	½" plywood ½" felt padding
12"	10½" diam.	27½"	21"	18½"	6"	13½"	5¼"	4½"	3"	½" plywood 1" felt padding
15"	13¼" diam.	33"	25"	21"	7"	18"	6½"	5½"	4"	½" plywood 1" felt padding

Construction Notes

1. In assembling cabinets, all mating joints should be securely glued and screwed together. Cracks or holes should be filled with plastic wood.

2. Large surfaces of the cabinet should be stiffened on the inside to prevent low frequency vibrations. Stiffening braces should be fastened to such surfaces to eliminate any low frequency resonances. When surfaces are tapped, only highly damped high frequency vibrations should result, and various sections should have different resonant frequencies.

3. Interior of the cabinet should be padded to prevent standing waves from being set up. Absorbing material should be placed directly behind the loudspeaker, and on one of each pair of opposing surfaces.

4. Grill cloth should be as light in weight and as porous as possible for minimum loss of high frequencies.

5. The dimensions given for each of the loudspeaker enclosures included may be varied to suit individual room space requirements. However, in the enclosed baffle and bass reflex cabinets, the internal volume and vent area must be maintained. For the labyrinth and folded horn cabinets, the line length and cross section must be maintained.

Typical Sound Insulating Materials

Rock Wool	Acousti-Celotex
Kimsul Insulation	Fiberglas, type FP 005
Cellufoam	Tufflex

Fiberglass padding or tile

ERS

	15 Inch
6008	Altec Lansing 604B, 603B
SP-12, SP-12-B	Electro-Voice SP15
ric S1201D	Jensen G-610, H-510, K-310
, K-210	Jim Lansing D-130
-131	Quam 15A10CO
7-8-1, 12UP-8-1	RCA LC-1A, 515S-2
O	Stephens 106AX, 102FR
2FR	
1, "Diffusicone"	
W	
tric 7288	
W12CS/AL	

RADIO & TELEVISION NEWS

DATA-PRINT 2

(Copyright 1952)

DECIBEL TABLE

Voltage Ratio (Equal Impedance)	Power Ratio	← — db + →	Voltage Ratio (Equal Impedance)	Power Ratio
1.000	1.000	0	1.000	1.000
0.989	0.977	0.1	1.012	1.023
0.977	0.955	0.2	1.023	1.047
0.966	0.933	0.3	1.035	1.072
0.955	0.912	0.4	1.047	1.096
0.944	0.891	0.5	1.059	1.122
0.933	0.871	0.6	1.072	1.148
0.923	0.851	0.7	1.084	1.175
0.912	0.832	0.8	1.096	1.202
0.902	0.813	0.9	1.109	1.230
0.891	0.794	1.0	1.122	1.259
0.841	0.708	1.5	1.189	1.413
0.794	0.631	2.0	1.259	1.585
0.750	0.562	2.5	1.334	1.778
0.708	0.501	3.0	1.413	1.995
0.668	0.447	3.5	1.496	2.239
0.631	0.398	4.0	1.585	2.512
0.596	0.355	4.5	1.679	2.818
0.562	0.316	5.0	1.778	3.162
0.531	0.282	5.5	1.884	3.548
0.501	0.251	6.0	1.995	3.981
0.473	0.224	6.5	2.113	4.467
0.447	0.200	7.0	2.239	5.012
0.422	0.178	7.5	2.371	5.623
0.398	0.159	8.0	2.512	6.310
0.376	0.141	8.5	2.661	7.079
0.355	0.126	9.0	2.818	7.943
0.335	0.112	9.5	2.985	8.913
0.316	0.100	10	3.162	10.00
0.282	0.0794	11	3.55	12.6
0.251	0.0631	12	3.98	15.9
0.224	0.0501	13	4.47	20.0
0.200	0.0398	14	5.01	25.1
0.178	0.0316	15	5.62	31.6
0.159	0.0251	16	6.31	39.8
0.141	0.0200	17	7.08	50.1
0.126	0.0159	18	7.94	63.1
0.112	0.0126	19	8.91	79.4
0.100	0.0100	20	10.00	100.0
3.16×10^{-3}	10^{-3}	30	3.16×10	10^{3}
10^{-2}	10^{-4}	40	10^{2}	10^{4}
3.16×10^{-3}	10^{-5}	50	3.16×10^{2}	10^{5}
10^{-3}	10^{-6}	60	10^{3}	10^{6}
3.16×10^{-4}	10^{-7}	70	3.16×10^{3}	10^{7}
10^{-4}	10^{-8}	80	10^{4}	10^{8}
3.16×10^{-5}	10^{-9}	90	3.16×10^{4}	10^{9}
10^{-5}	10^{-10}	100	10^{5}	10^{10}
3.16×10^{-6}	10^{-11}	110	3.16×10^{5}	10^{11}
10^{-6}	10^{-12}	120	10^{6}	10^{12}

it. If the room or closet at the rear is large, the mounting approaches the properties of an infinite plane and no treatment of either room is needed. When the room or closet at the rear is so small that it approaches the dimensions of the cabinets as listed in the chart (*i.e.*, where the maximum dimension of the enclosure is less than a quarter-wavelength at the low frequencies), the walls must be lined with absorptive material as shown for the smaller cabinets—in such cases it might be better to construct a suitable cabinet which would then be built into the room or closet.

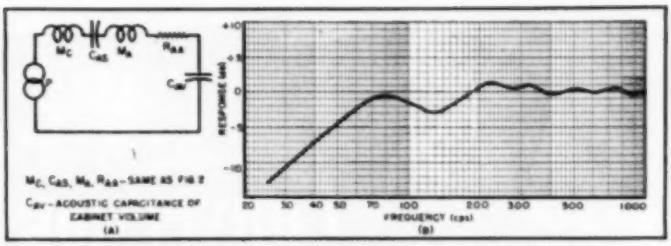


Fig. 3. (A) Equivalent electrical circuit representation of speaker mounted in infinite baffle cabinet. (B) Frequency response of speaker in infinite baffle cabinet.

Bass-Reflex Cabinets

The bass-reflex cabinet is probably the most popular and widely used of all the different loudspeaker cabinet designs. It is very simple to construct and, when properly designed, gives excellent acoustic results. Many manufacturers provide such cabinets for use with their loudspeakers, and they have been used commercially for loudspeakers ranging in size from 8-inch to the large 18-inch low-frequency units of dual systems used in theaters and auditoriums.

The basic principle of operation of the bass-reflex cabinet is the use of acoustical networks to increase the low-frequency response of the loudspeaker. The construction is shown on the "Data-Print," and can be seen to consist of a closed cabinet with an opening in the front close to the loudspeaker. The volume of the cabinet has the properties of an acoustical capacity, while the opening in the front has the properties of an inductance in series with the acoustic resistance of the air. The effect of the bass-reflex cabinet on the response of the loudspeaker is, therefore, the same as if the system were replaced by the circuit of Fig. 4. The response at low frequencies is that of two tuned circuits coupled together, with the currents in the two resistors representing the sound radiated into the air. The low-frequency response is increased by the coupling of the two tuned circuits, because the currents in the two resistors are in phase, and the sound from both the front and the back of the cone is therefore useful.

However, good results are obtained from the bass-reflex cabinet only when it is properly designed to match the size and resonant frequency of the loudspeaker with which it is to be used. Improperly designed cabinets will produce undesirably boomy and resonant bass, therefore the experimenter who constructs his own bass-reflex cabinet should be careful to use proper dimensions in his construction. The design conditions which have been found to give satisfactory results are that:

(*a*) The resonant frequency of the vented enclosure should be approximately the same as that of the loudspeaker.

(*b*) The aperture or area of the vent should approximate the effective radiating surface of the loudspeaker.

The table shown in connection with the bass-reflex information in the "Data-Print" gives the various physical values and dimensions for the design of bass-reflex cabinets for any of the good standard and high-fidelity 8-inch, 10-inch, 12-inch, and 15-inch loudspeakers in general use at the present time. Acoustical absorbing material is placed on the inside of the back wall opposite the speaker and on one of each two opposing walls, to absorb the middle and higher frequencies in the cabinet to prevent any destructive interference with the radiation from the front of the speaker, and to eliminate any resonant vibrations inside the cabinet. The vent should be placed close to the loudspeaker, since mutual coupling between the two results in better sound radiation into the air. Because of normal variations in different commercial loudspeakers, the dimensions given in the chart may not be exactly optimum for the particular loudspeaker used in any individual application, and certain adjustments of these dimensions may be necessary.

The simplest method of adjusting the characteristics of the cabinet is by making the area of the vent adjustable. The constructional details of such an adjustable vent arrangement are shown in the "Data-Print." A sliding panel held in place by wing nuts is used to tune the cabinet by changing the port opening, and the initial opening is made larger than required to permit tuning above and below the optimum frequency. The adjustment of the opening can then be done by ear until the cabinet has been matched to the loudspeaker and the room to give the best overall reproduction quality.

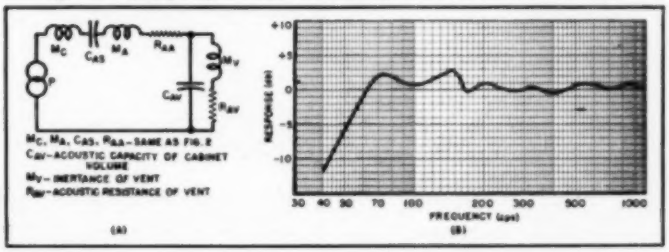
Acoustical Labyrinth Cabinets

Another type of resonant phase inverter cabinet which makes the radiated sound from the back of the loudspeaker cone useful at low frequencies is the acoustical labyrinth. In this type of enclosure, the acoustic tuned circuit of the bass-reflex cabinet is replaced by a resonant line. An absorbent-walled tube is coupled to the back of the loudspeaker at one end, and is open to the air at the other end. At the frequency for which it is one-quarter wavelength long, this tube sees a low impedance at the open end, and therefore presents a high impedance to the back of the loudspeaker cone. Thus, by choosing the length of the tube so that it is a quarter-wavelength at the resonant frequency of the loudspeaker suspension, the resonance of the speaker is damped in the same manner as with the bass-reflex cabinet. At double the resonant frequency, the tube is a half-wavelength long and the phase is reversed, therefore the sound through the tube is in-phase with that from the front of the loudspeaker and the response is increased. The tube lining absorbs almost all of the sound above 150 cps therefore the higher resonances have no effect.

In the labyrinth cabinet, this resonant tube is folded so that the total outside dimensions are practical for use in the home or studio. The practical values and physical dimensions for construction of typical labyrinth cabinets for the various commercial loudspeakers are given on the "Data-Print." For the same loudspeaker, the labyrinth occupies less space than the bass-reflex cabinet, while the bass-

(*Continued on page 98*)

Fig. 4. (A) Equivalent circuit of a loudspeaker in a bass-reflex cabinet. (B) A typical frequency response curve for a loudspeaker in a bass-reflex cabinet.



U.H.F. Conversion Methods

Part 1. Although tuners and converters are now ready, the end of the freeze brings many new design problems for engineers and technicians.

By
NOEL EDWARDS



Fig. 1. RCA's ultra-high-frequency converter for use in any area having u.h.f. stations. It provides coverage of the entire u.h.f. band. The unit is housed in a compact cabinet which has two knobs—the left-hand knob has three positions ("off," v.h.f., and u.h.f.) while the right-hand knob is for tuning. This converter is designed to be used with any present-day video receiver.

THE conversion of a standard v.h.f. receiver for u.h.f. reception is not difficult. It consists of either replacing an unused v.h.f. channel strip with a u.h.f. version, Fig. 5, or adding an external converter that will supply a signal to the antenna input of the v.h.f. receiver, Fig. 1. Consequently, with a few connections u.h.f. reception can be added to a present v.h.f. receiver. At many sites it will be far more difficult to overcome the vagaries of propagation and antenna performance than it will be to handle the signal after it reaches the end of the transmission line.

Plug-In Strips

Certain v.h.f. receivers, depending on the type of tuner employed, can be prepared for u.h.f. reception with a plug-in adapter strip. When a turret-type tuner is used, an unused v.h.f. channel strip can be removed and a u.h.f. replacement strip inserted in its stead. If there is more than a single u.h.f. allocation in your area, additional unused strips can be removed and replaced with u.h.f. channel strips. In general, a separate strip will be required for each u.h.f. channel to be received in a given area.

Instead of vacuum tubes the u.h.f. channel strip employs two crystals—a crystal mixer and a crystal harmonic generator. The mixer crystal, a high frequency type, is small in size, has low capacity, and an excellent signal-to-noise ratio, while the crystal harmonic generator is larger physically and a more common type (such as the 1N34). This latter crystal is often biased carefully to enhance its harmonic generating ability.

The operating principle of the u.h.f. plug-in strip, Fig. 2, is to first mix the incoming u.h.f. signal with a u.h.f. local oscillator component derived from the v.h.f. local oscillator through harmonic generation. The difference frequency at the output of the crystal mixer matches the frequency on which the v.h.f. tuner must be set for u.h.f. reception. Thus the r.f. amplifier of the v.h.f. tuner acts as a *high frequency* i.f. stage. The signal is mixed again but now with the fundamental v.h.f.-tuner local-oscillator frequency to produce the standard i.f. output range (can be considered the low frequency i.f. section of a double conversion process).

A mathematical interpretation will clarify the technique. Let us assume we want to receive a u.h.f. signal on the first u.h.f. channel (picture carrier frequency of 471.25 megacycles). If a 98.5 mc. high i.f. frequency is decided upon, the u.h.f. local oscillator frequency would be 471.25 minus 98.5 or 372.75 mc. The u.h.f. local oscillations must have a frequency lower than the u.h.f. signal frequency to obtain correct relative positioning of sound and picture carriers at the out-

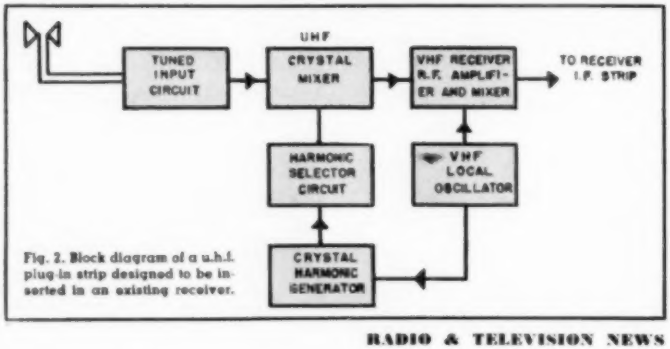


Fig. 2. Block diagram of a u.h.f. plug-in strip designed to be inserted in an existing receiver.

put of the v.h.f. mixer. Picture and sound carrier frequencies at the output of the u.h.f. mixer would be:
471.25—372.75=98.5 mc. picture carrier
475.75—372.75=103 mc. sound carrier

This output is applied to the r.f. amplifier input of the v.h.f. tuner. Tuned circuits of the r.f. amplifier and mixer have been set on this frequency by the v.h.f. coils of the u.h.f. plug-in strip. Thus the r.f. stage acts as a high frequency intermediate amplifier. At the v.h.f. mixer the signal is mixed with the v.h.f. local oscillator frequency to produce standard i.f. frequencies of the v.h.f. receiver or:
124.25—98.5=25.75 mc. picture carrier
124.25—103=21.25 mc. sound carrier
Observe that the u.h.f. local oscillations represent the 3rd harmonic of the v.h.f. oscillator fundamental frequency. It is the function of the crystal harmonic generator to develop a strong third harmonic from the fundamental local oscillator frequency. An arrangement such as this, employing a v.h.f. harmonic for u.h.f. mixing, means that the u.h.f. strip requires no separate u.h.f. oscillator tube and associated circuit components.

Commercial Plug-Ins

The u.h.f. channel strip arrangement can be used with the *Zenith* turret tuner and a similar method is planned by *Standard Coil*, Fig. 8, for those receivers using their tuner. The *Zenith* plug-in strip has three basic functional sections. There is a u.h.f. section consisting of an input filter, double-tuned input transformer (coupling between antenna and crystal mixer), and a u.h.f. crystal mixer.

The u.h.f. antenna system is coupled into the strip through a two-turn loop, Fig. 3, at the low impedance end of the primary of the double-tuned transformer. Consequently, an impedance match and voltage step-up is obtained through transformer action. A double-tuned transformer between the antenna and mixer permits peak selectivity, high "*Q*", and excellent off-frequency signal rejection. The antenna, mixer, and multiplier resonant circuits are completely shielded in individual cavities to minimize spurious resonances and direct feedthrough of undesired signals. Coupling between the two sides of the double-tuned transformer is a mutual inductance in the form of a small cylindrical bushing at the low impedance ends of the resonant windings. No resistive damping is required as suitable bandwidth is attained with the damping influence of antenna and crystal mixer.

A small loop links the secondary or mixer-tuned circuit with the crystal circuit while the mixer circuit also includes a small portion of the multiplier inductor serving as a means of introducing u.h.f. local oscillations.

The i.f. output of the crystal mixer is coupled into the v.h.f. section of the tuner through a low-pass section that filters out u.h.f. variations. The signal is applied to the grid of the r.f. amplifier and is amplified by this stage,

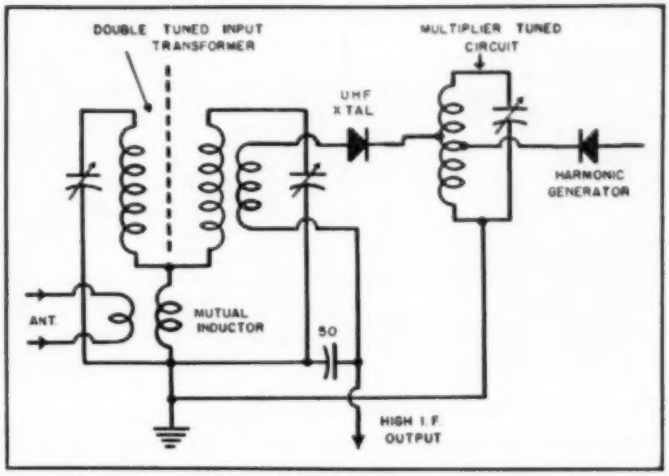


Fig. 3. The u.h.f. section of the Zenith ultra-high-frequency converter strip.

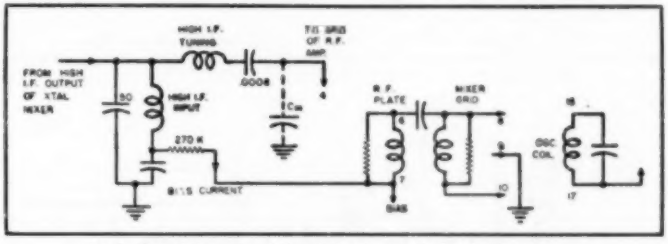
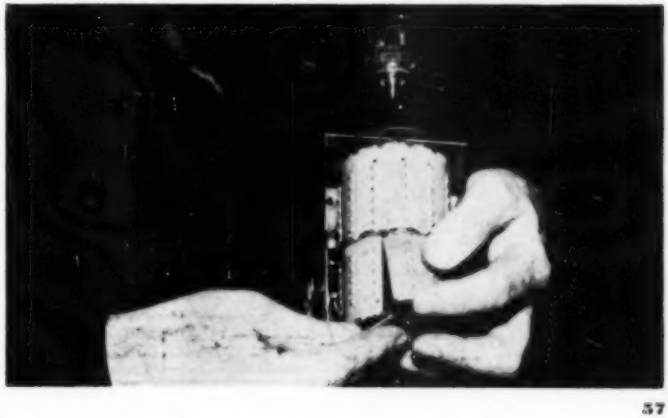


Fig. 4. The v.h.f. section of the u.h.f. strip used in Zenith TV receivers.

the v.h.f. tuner r.f. amplifier plate and mixer grid circuits being resonated to the i.f. frequency of the crystal mixer output. Inductors of these resonant circuits are mounted on the u.h.f. strip, Fig. 4. This high frequency i.f. and v.h.f. local oscillator signal heterodyne to produce a still lower frequency i.f. that corresponds to the i.f. range of the v.h.f. receiver.

The v.h.f. local oscillator is also the fundamental source of signal for the u.h.f. harmonic generator section of the tuner strip. Excitation is obtained from the plate circuit of the v.h.f. oscillator, Fig. 7, and is applied through an *RC* time constant to the multiplier crystal. This *RC* circuit biases the crystal so its current flows just on crests of excitation, producing crystal

Fig. 5. The simple manner in which u.h.f. channel strips can be substituted for the v.h.f. channel strips in the Standard Coil Products TV tuner.



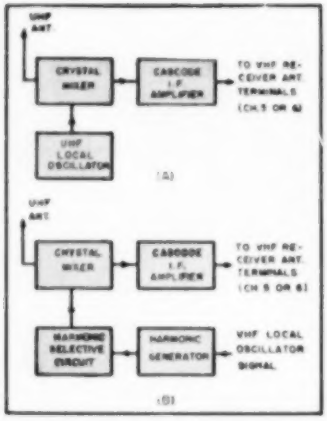


Fig. 6. Two u.h.f. converter methods.

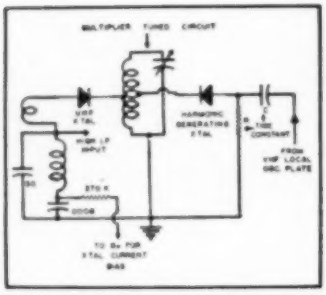


Fig. 7. Harmonic generating section.

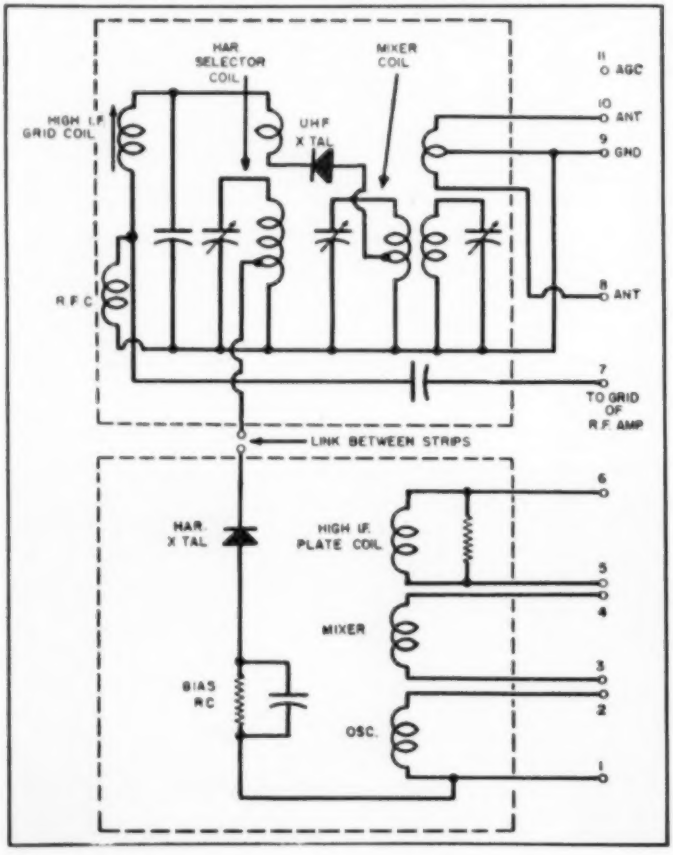
current bursts that are rich in harmonics. These current bursts excite the multiplier resonant circuit which is tuned to a harmonic of the fundamental frequency. Thus a harmonic sine wave is formed that serves as an injection signal for the u.h.f. crystal mixer.

To produce a strong u.h.f. harmonic component some biasing of the crystal is helpful. Bias current as obtained through a 270,000 ohm resistor to "B+", selects an operating point near maximum curvature of the crystal characteristic. Non-linearity at this point accents harmonic levels.

The *Standard Coil* plug-in strip has the same plan. Note that the terminals on the right, Fig. 8, correspond to the numbered terminals of the *Standard Coil* tuner. The antenna is connected through terminals 8 and 10. The antenna coil is coupled to the primary of the double-tuned mixer transformer while the crystal mixer taps off a low impedance point of the secondary and is also coupled to the harmonic selector resonant circuit to obtain a u.h.f. injection signal.

The mixer output circuit is resonated to a high i.f. frequency and the i.f. signal is applied to the grid of the r.f. amplifier via terminal 7. The r.f. amplifier plate, mixer grid, and v.h.f. local oscillator circuit inductors are also a part of the v.h.f. strip. The local oscillator signal must also be applied to the crystal harmonic generator through an *RC* biasing network, the proper harmonic being selected by the u.h.f. resonant circuit to develop an exciting u.h.f. sine wave for the u.h.f. crystal mixer.

Fig. 8. Standard Coil Product Company's u.h.f. converter plug-in strip.



Basic Converter Types

The most common type of u.h.f. converter, Fig. 6, consists of a crystal mixer, u.h.f. local oscillator, and a single cascode i.f. amplifier. At present this plan permits production of an economical and effective u.h.f. unit, capable of tuning over the entire v.h.f. band. It can be attached to all types of v.h.f. receivers.

A second possibility, like the plug-in arrangement, employs a system of harmonic generation using a low fundamental local oscillator frequency and proper harmonic mixing to derive u.h.f. local frequency. Initially, r.f. amplifiers will not be prevalent because of the expense involved in establishing a suitable signal-to-noise ratio using vacuum tubes in the u.h.f. band.

A crystal mixer without a preceding r.f. stage lends itself well to converter application because of its favorable u.h.f. performance. A crystal mixer has a low noise content and requires only a low local oscillator injection level. Therefore, a high signal-to-noise ratio can be retained and the local oscillator radiation problem minimized.

A crystal mixer attenuates rather than amplifies the applied signal. The usual vacuum tube mixer, although it does not have a high enough gain for straight amplifier use, at least has some gain when used as a mixer. The crystal mixer can introduce a 6 to 9 db loss—signal level at the output of the crystal mixer being substantially less than the input signal level from an antenna system. It is significant that the output frequency is also much lower, however, and it will be easier to establish favorable signal-to-noise relations.

Insofar as vacuum tube operation is concerned, a given tube will have a higher noise content and a resultant poorer signal-to-noise ratio the higher

(*Continued on page* 113)

INTERPRETING that TV PATTERN

By
KEN KLEIDON
Belmont Radio Corporation

Part 3. Concluding article covers a.f.c., the horizontal oscillator and deflection, and the high voltage section of TV set.

THIS is the third and final article in this series. By referring to the two previous articles, it can be realized that this television troubleshooting procedure is based on using the picture tube as a source of servicing information or as a readily available piece of test equipment. By analyzing the deviations from a normal picture, the TV technician can determine which section of the receiver is causing the trouble and then logically proceed to localize the defective stage. Then by the use of resistance or voltage measurements, the defective component or components can easily be found. Learning to interpret the information presented on the face of the picture tube into circuitry has proven to be a quick, easy, and modern method of TV troubleshooting for the ambitious or enterprising technician.

This article deals in general with troubles occurring in the automatic horizontal frequency control, horizontal oscillator, horizontal deflection, and high voltage sections of a television receiver. The various other sections were covered in the two previous articles.

The condition of horizontal non-synchronization as illustrated in Fig. 1 is a common trouble known to all technicians. The usual cause of this trouble is the misadjustment of the horizontal hold control. Most manufacturers provide two horizontal hold controls, one on the front (variable resistor in place of R_m in Fig. 7) as a "Fine Horizontal Hold" control and a coarse stabilizing coil adjustment at the rear of the set (L_m). If the front control will not bring the picture in sync then the rear control adjustment at the stabilizing coil should be attempted. Before adjusting the coarse control it is a good practice to first place the "Fine" control in the center of its adjustment range. This will provide the customer with a full adjustment range at the front of the receiver. Because of the wide pull-in range of the a.f.c. circuit, a front control is not utilized in present *Raytheon* receivers. After adjusting the coil control for steady picture, set the coil core to the center of its range, (center position before going out of sync in either direction). This will provide a more stable sync operation. As a check to determine whether the controls are adjusted properly, simply switch from one station to another and observe the face of the picture tube. The picture should stay in sync. Rotation of the horizontal hold control will vary the horizontal centering of the picture. This control should not be used to center the picture as an out-of-sync condition may occur when switching from one channel to another.

Other defects causing an out-of-sync condition horizontally may be a weak or dead a.f.c. or horizontal oscillator tube, input grid leakage, defective frequency controlling components in the oscillator, or an unbalance in the a.f.c. network. Almost all receivers use some form of automatic frequency controlling circuit to provide a more stable sync operation. Fig. 7 shows a unique a.f.c. circuit where two feedback pulses obtained from a separate center-tapped winding in the horizontal deflection transformer are integrated and applied to the plates of a dual-diode a.f.c. tube. The two pulses are of opposite polarity and are of the

Fig. 1. Poor horizontal sync illustrated here is approximately 300 cycles slower than the station's horizontal frequency. The horizontal blanking diagonal bars will slope in the other direction if frequency is 300 cycles faster than the station's.

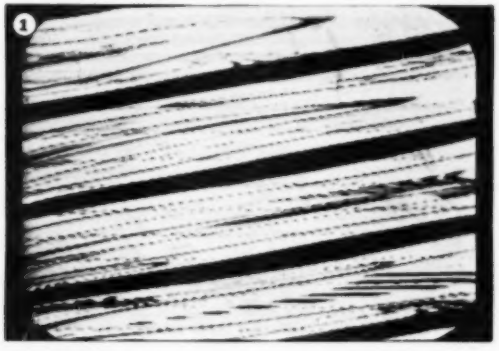


Fig. 2. Hum in a.f.c. The 60-cycle component modulating picture is evidenced by a single sine-wave distortion of horizontal phase. The amount of distortion will vary with the magnitude of the 60-cycle component. It may move vertically on screen.



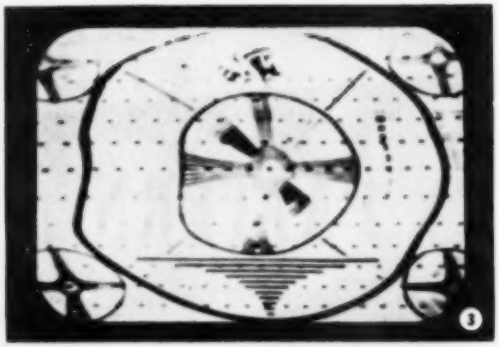


Fig. 3. A 120-cycle component modulating the picture is evidenced by a double sine-wave distortion of horizontal phase. Amount of distortion will vary with magnitude of component.

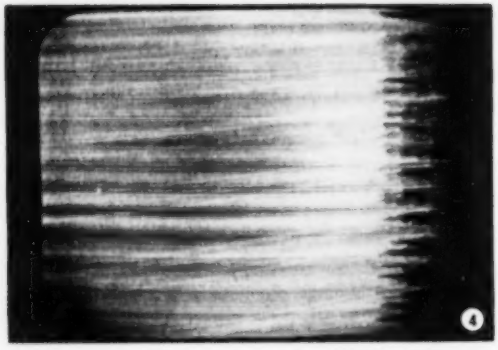


Fig. 4. Horizontal squegging. Tearing, pulling, or ripping of picture in horizontal direction may appear in many different forms. Bright flashes and high-pitched noise are also present.



Fig. 5. Barkhausen effect. Interference appears as black vertical lines which generally vary with tuning. These bars may appear in various positions on the screen of the picture tube.

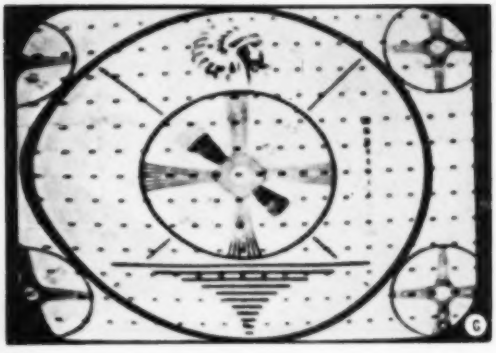


Fig. 6. Improper geometrical distribution of the picture horizontally results in a bulged or egg-shaped appearance on screen.

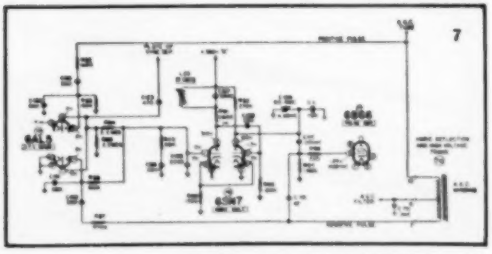
Fig. 7. Schematic of a.f.c. and horizontal oscillator section of recent model television receiver manufactured by Raytheon.

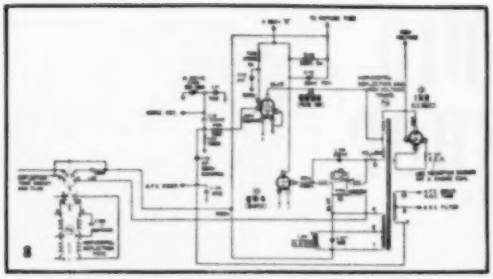
same frequency as the horizontal oscillator. The station horizontal sync pulse is applied to the cathodes from the sync separator through condenser C_{125}. Any frequency or phase shift occurring between the station horizontal sync pulse and the feedback pulses will cause one diode section to conduct more than the other. This will produce a d.c. bias voltage which is applied to the grid of the horizontal oscillator to change the oscillator's operating frequency to agree with that of the station. Therefore, if there is any unbalance in the a.f.c. network an incorrect bias voltage will be applied to the grid and may cause an unstable out-of-sync condition depending upon the degree of unbalance.

Another condition of horizontal non-synchronization may appear as shown in Fig. 2, after the hold control is adjusted for a steady picture. This condition is evidenced by a single sine-wave distortion of the picture horizontally. Since the vertical frequency in the present television system is 60 cycles, a modulating frequency of 60 cycles will appear as one full sine-wave. (A portion is lost in retrace.) Most of the present day television receivers make use of full-wave rectification in the low-voltage power supply which produces a 120-cycle component. Therefore, if the receiver under observation incorporates a full-wave rectified supply and the condition illustrated exists, then the only possible cause of the trouble could be traced to the 60-cycle filament supply. The usual cause of the condition illustrated in Fig. 2 is due to a cathode-to-filament short or leakage in either the automatic frequency control (a.f.c.) or horizontal oscillator tubes (usually sync handling tubes having high cathode impedance to grid).

The amount of distortion in the horizontal direction will vary with the degree of the 60-cycle component. A severe condition is illustrated to make the effects more apparent. The 60-cycle hum displacement from the local power line may move vertically (snaking) when receiving network programs. This is due to the transmitter being operated from a different 60-cycle power source or a crystal for the vertical frequencies. However, this condition will remain stationary even when the vertical is allowed to roll if it results from vertical loading at the boost or boot-strap electrolytic. If substitution of the a.f.c. or horizontal oscillator tubes does not eliminate the trouble, then check condenser C_{138} (boot-strap electrolytic). See Fig. 8.

The condition illustrated in Fig. 3 represents the effects of a 120-cycle component modulating the picture. This is evidenced by the appearance of two complete sine waves distorting the picture horizontally. Here again, the amount



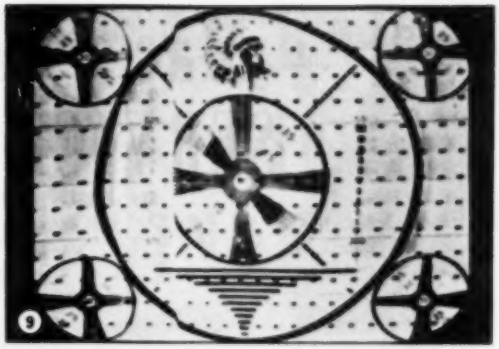


of distortion or displacement will vary with the amount of 120-cycle component. The 120-cycle hum illustrated is similar to the horizontal displacement condition shown in Fig. 6 in Part 2 of this series (May issue). Close observation should distinguish the difference. The horizontal displacement condition will generally vary in vertical positioning with changing picture composition whereas the 120-cycle hum condition may vary vertically only while receiving network programs. The 120-cycle hum condition is generally due to improper low voltage filtering caused by defective filter condensers, filter chokes, or low voltage rectifier tubes. A similar condition may be due to an unstable horizontal oscillator caused by improper value of plate load resistor R_{22} or hold coil L_{23}. Refer to Fig. 7.

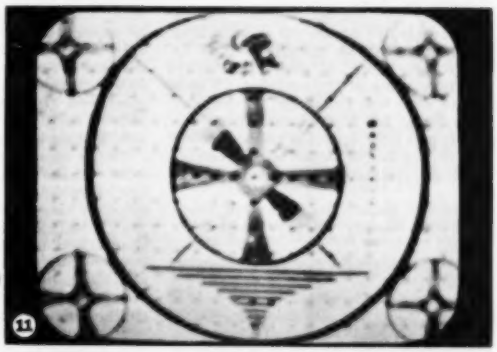
The condition of horizontal squegging (Fig. 4) may appear in various forms. Whenever this or similar conditions are observed on the face of a picture tube, the receiver should immediately be turned off as transients resulting from squegging may result in surge voltages that can cause arcing which may damage the pulse amplifier tube or horizontal deflection and high voltage transformer. This condition may be tunable, that is, it may occur intermittently when tuning from channel to channel. This is generally due to strong Barkhausen radiating frequencies. Refer to Fig. 7 and section on Barkhausen in this article. Other possible causes of this condition may be an unbalance in the a.f.c. network, check R_{21}, R_{27}, C_{26}, C_{25}, or balance of C_{25a}-C_{25b}, R_{27}-R_{28}, R_{27}-R_{29}, or a defective horizontal oscillator tube. Improper "Q" of the hold coil or the incorrect value of resistor R_{27} may cause this condition.

Barkhausen is an interference oscillation generated by spiralling electrons within the horizontal pulse amplifier tubes. One example of this type of interference is illustrated in Fig. 5. This phenomenon is not a fault of the receiver, but is due to the construction of the 6BG6 tubes and is related to inherent screen grid and plate voltage relationships. The interference admittance will vary with tuning and can be disregarded if it appears between active channels. If the interference persists while receiving a picture, the following suggestions should be tried to either reduce or eliminate the effects: dress the antenna transmission line as far away from the a.c. line cord or the horizontal output section of the receiver as possible, or try substituting 6BG6 tubes. In low signal areas, more than one tube substitution may be necessary. When the tube is inserted which eliminates the effects in the picture, the original or the previously substituted tubes are not necessarily

(*Continued on page* 106)







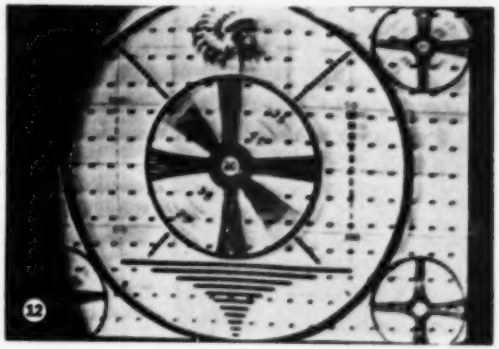


Fig. 8. The horizontal deflection section of a Raytheon TV set.

Fig. 9. Drive bars. Bright white vertical line or lines usually cause scan slow-down, resulting in picture foldover. Generally it will appear in center or at left-hand section of the screen.

Fig. 10. Damping failure. Severe center foldover results in a partial or total loss of the picture from the cathode-ray tube.

Fig. 11. An example of poor focus. Loss of picture definition with poor horizontal and vertical wedge resolution are typical.

Fig. 12. Yoke misorientation and miscentering. In this instance vertical and horizontal edges are visible and picture may be tilted. Corner or neck shadow may be present in this case.

Mac's RADIO SERVICE SHOP

By JOHN T. FRYE



SALESMEN AND SERVICE TECHNICIANS

"SNAP . . . b-o-o-o-o-m!" went the nearby stroke of lightning, and this was all the cue Mac and his assistant, Barney, needed to send them scrambling around pulling switches and grounding antennas in the service shop.

"These late-spring thunder storms can certainly sneak up fast," Mac commented as he double-checked to make sure none of the test instruments nor any of the radio or TV sets in the shop was connected to the line. This done, he washed and dried his hands and then squatted tailor-fashion on one end of the bench with a heavy, black-and-yellow jacketed book in his lap.

"Finally get around to reading *Gone With the Wind?*" Barney asked curiously.

"Nope, you might say that I'm doing my homework. Last night I was caught with my audio down. A fellow came to the house and told me he had been appointed chairman of a committee to buy some recording equipment for his church, and he had a list of questions as long as your arm that he expected *me* to answer right off the reel. When he started asking which was better: wire or tape? why was it better? how much better? which recorders had remote control features? etc., I was jarred by the realization that we have been so busy trying to hang on to the flying coattails of television that we've let recent developments in audio slip away from us.

"I candidly told the fellow I was not prepared to advise him until I had done a little research on the latest recorders but, if he would give me a couple of days to study up on the newest wrinkles in that field, I'd try to give him all the dope he wanted. I began trying to dig the information out of my files of back issues of magazines, but I soon found that sifting what I wanted out of that wealth of material was going to be a long, tedious process. Fortunately, there are some good books on the subject. I was lucky enough to pick up a copy of the latest edition of the standard reference book, *The Recording and Reproduction of Sound*, released by *Howard Sams*. Wire and tape recorders are compared from every possible angle and, in each case, it is explained why one is superior to the other."

"What else does the book cover that would make it worthwhile spending my valuable time, not to mention my dazzling brain power, to read it?" Barney asked, as he bent over Mac's shoulder and peaked at the diagrams.

"The chapters on p.a. equipment, installation, and service are right up our alley," Mac replied. "So is the material on custom sound installations and the detailed description and illustration of how to use the scope in audio servicing. I just now noticed, too, that complete constructional information is given on building several different types of speaker enclosures. I'll pass that along to Paul Cockley, who has been hounding me ever since Christmas for some down-to-earth information along that line. In fact, I believe that just about any question that comes up in connection with sound equipment here in the shop will find an up-to-date answer in this book; and here and now I am assigning it to you as required reading just as soon as I am finished with it."

Before Barney could answer, the front door banged open beneath the onslaught of two men hurrying to get in out of the downpour.

"Well, well," Mac observed; "I've read that when the weather is bad enough, rabbits and rattlesnakes will den up together, but I didn't think a spring shower would drive a couple of rival parts salesmen to doing the same thing. Hello, Art. How are you, Dick?"

"I'm okay," Dick replied; "but aren't you afraid you'll hurt Art's feelings calling him a rattlesnake?"

"It's just that those jackass ears of yours fool him into thinking you're the Easter Bunny," Art retorted; "but just to show you what a great and generous soul I am, you may have Mac first. Take him into the back room, get out your rubber hose, and try to beat an order out of him while I stay up here and make mad love to Matilda; then I'll take him."

"That won't be necessary," Mac answered as he took a couple of sheets of paper from a desk drawer and handed one to each. "There are your orders, all fixed out. And now if Matilda will order some sandwiches and *Cokes*, I'll stand treat all around."

In a few minutes all of them were comfortably seated in the service shop munching sandwiches the boy had brought from the restaurant next door. Matilda occupied the high stool in the middle of the floor, and the men were lined up on the service bench in front of her.

"Suspense is keeping me from enjoying this to the full," Dick said slowly. "I keep wondering what it's going to cost me. When a flinty old Scotchman like Mac breaks down and starts shelling out his rusty nickels in this unseemly fashion, there's something behind it."

Mac's eyes squinted in a grin as he tilted his *Coke* bottle toward the ceiling. "'Always looking a gift horse in the molars," he murmured. "It does so happen, though, that I've been wanting to talk to you two leeches. I'm slated to give a little talk at our next technicians' organization meeting on how parts salesmen and technicians can help each other, and I thought you two might have some suggestions.

"Do we!" Art and Dick answered in chorus.

"For one thing," Art led off, "not one technician in ten has his order ready for us as you just did, even though he knows that we call on him at the same time each week. If he would just do that one thing, it would save a lot of time for him and us, too."

"And a lot of them never order by manufacturer or part number," Dick added. "They just point at a chassis and say, 'I need a new contrast control for that one.' If they would just use the replacement catalogues we leave with them, or the parts numbers given in the service manuals, it would not only save time for everyone concerned, but it would also avoid mistakes in filling orders."

"The technician who gets me," Art chimed in, "is the one who deliberately

(*Continued on page* 109)

TWO-WAY RADIO for INDUSTRY



Two models of the Hallicrafters' "Littlefone," one with handset and the other with earpiece and portable hand microphone.

Lightweight, portable units speed operations for a wide variety of industrial plants and stores.

By
FRITZ A. FRANKE
Asst. Sales Mgr., Radio & Communication
The Hallicrafters Co.

THE two-way radio-telephone system for industrial and commercial application is a new "tool" for production, processing, and scheduling of factory operations.

This type of hand-carried and fixed equipment is exemplified by the new *Hallicrafters* "Littlefone." Simplicity is the keynote of these radio-telephone units. The main switch is turned on and, if the channel is clear, the press-to-talk button in the center of the handset is depressed and the contact is made. When the transmission is completed, the button is released and the called party can then reply. Built-in squelch is provided so that no sound is heard either from the receiver in the handset or from the loudspeaker unless a message is coming in. There are no popping, frying, or crackling noises because of this squelch circuit. In addition, both the receiver and transmitter operate as an FM system. The equipment itself is simple to use. Even the most unskilled personnel can obtain maximum utility from the equipment.

All radio transmitters must be licensed by the Federal Communications Commission. The FCC has defined the various categories under which radio transmitters may be licensed, *i.e.*, amateur, aviation, broadcast, public safety, maritime, and industrial radio services. A further division is made in the case of industrial radio services to describe a "low power industrial service" wherein the transmitter input does not exceed three watts. Any person, association, or corporation engaged in a commercial enterprise who can show that it is in the public's convenience, necessity, or interest that they be granted a license is usually granted such a license by the Commission.

While it is beyond the scope of this article to discuss all of the classifications of services, as defined by the FCC, which may use this type of equipment, suffice it to say that the application of such systems is virtually unlimited. A copy of Part 11 of the Federal Communications Commission Rules which covers this type of service is available from the U.S. Government Printing Office. It is interesting to note, however, that all stations licensed under the "low power industrial service" classification are licensed as mobile stations even though they may never be moved from an office desk. The frequencies available for assignment to low power industrial stations, other than aircraft, are as follows: 33.14, 35.02, 42.98, and 154.57 mc. The frequency of 27.57 mc. is also available for equipment installed in aircraft.

The actual application of this type of equipment is almost beyond the scope of the imagination. One large lumber yard has found that by equipping its yardmen with portable units and installing the central station in the yard office, it is possible to speed up the monthly inventory operation sixfold. In a large industrial plant maximum utilization of expensive stock handling machinery has been accomplished by installing "Littlefones" on the lift trucks so that they can be dispatched efficiently, thus more than tripling the utility of the lift trucks.

The portable, hand-carried version of these units weighs from 9½ pounds for the dry battery models to 14 pounds for the higher powered rechargeable storage battery units. Two of these units, when used at ground level, provide radio-telephone communication over a distance of approximately two miles in industrial areas. Reinforced concrete and internal structural steel in large buildings do not appreciably affect transmission. Such units have been employed successfully to communicate from the top to the bottom floors of massive structures such as the Conrad Hilton Hotel and the Merchandise Mart in Chicago —two of the world's largest buildings.

Two-way communications have been maintained from the bottom to the top of mine shafts ranging up to a half mile in depth. With the proper antenna heights, distances up to two miles can be covered between moving autos, trucks, or trains. Any two or more of these sets, when operating on

(*Continued on page* 145)

A "Littlefone" in action. A carrying strap leaves hands free to operate unit.



FACTORS Influencing High Fidelity



BBC's Maida Vale studio has been recently remodeled to improve the acoustics for orchestral programs. Better tone and definition has been obtained by applying a special acoustic treatment to walls above and below the balcony.

By
E. E. PARKER
Gates Radio Company

The role of circuitry and components in obtaining high-quality performance from audio equipment.

BUILDING an audio amplifier is relatively easy, but building an amplifier having wide frequency response, low distortion, and low noise level can be most difficult as many of us can testify. The following will serve as a rough guide. It is based on actual shirt-sleeve practice in the design of commercial amplifiers. The writer has found it of value in the initial layout and design as well as the evaluation of the results obtained in testing the initial unit.

Noise

Noise as treated here may be divided roughly into two groups.

(*a*). Noise of a periodic nature, such as hum or microphonics. This is noise which has a definite repetition rate or frequency.

(*b*). Noise of an aperiodic nature, such as hiss or scratch having no definite repetition rate or frequency. Viewed on an oscilloscope, it is displayed as random pulses or "grass." This type noise is usually due to thermal agitation or the "Johnson effect."

The thermal agitation noise originates mostly in resistors and components through which current flows. Carbon resistors are by far the greatest source of this type noise. "Johnson" noise originates within the tube proper and is due to the fact that the electrons are not emitted by the cathode in a steady stream but in a stream of varying intensity. It may be compared to the sparks given off from molten steel. This effect is also commonly known as the "shot effect."

The following design considerations are directly related to the final noise level achieved in the finished product.

1. *Low Gain-Per-Stage*—Low noise level and low gain-per-stage are always synonymous in low level circuits where the signal or audio level is on the order of —40 dbm or lower. This means more stages of amplification and a consequent increase in cost. The low gain-per-stage prevents each tube from contributing excessively to the noise level since the amplification at that point will be only a small proportion of the over-all amplification.

It is interesting to note that low gain-per-stage results in a decided decrease of microphonics. In fact, the increase in cost of an additional low gain stage may be largely offset by eliminating shock mounting of the low level stages.

2. *Low Grid-to-Grid (in push-pull) or Low Grid-to-Ground Impedance*—This lessens inductive hum pickup in the case of low level input transformers to a large degree. Fortunately, a low grid-to-ground impedance in input transformers also results in better high-frequency response. Practice indicates that grid-to-grid or grid-to-ground total impedance should be no greater than 60,000 ohms.

3. *Use of a Common Ground Bus Bar*—A common ground bus bar insulated from the chassis and grounded at one point only eliminates hum pickup due to "ground loops." Ground connections in each stage should tie on at the same point on the bus bar. This insures the absence of ground return loops which may introduce hum or form a means of undesirable coupling between stages resulting in oscillations or instability.

Fig. 3 shows a broadcast amplifier employing this type of common ground bus bar construction. Note the manner in which it is insulated and supported above the chassis.

In practice, the exact ground point on the bus bar is best found by experimentation. As a rough rule and as a starting point, it is better to ground the high level end, that is, the end of the bus next to the output stage or stages.

4. *Use of Triodes*—Triodes in the low level stages result in less noise of both the periodic and the aperiodic type. This is at the expense of gain, however. As pointed out previously, both high gain and low noise level in one stage are seldom obtainable in high quality amplifiers.

Triode-connected pentodes perform quite well, and will be found in many broadcast quality amplifiers.

There is less "hum modulation" in triodes due to smaller grid-to-plate spacing, that is, external as well as internal fields affect the electron stream to a lesser extent.

Hiss or shot-type noise is less troublesome, because there is less "partition noise" in triodes than there is in multi-element tubes.

Noise in triodes is largely shot noise, which is reduced by the high space charge at the cathode.

Microphonics are less troublesome in triodes, since the gain is considerably less per stage.

5. *Non-Magnetic Chassis*—The use of non-magnetic chassis material having good electrical conductivity pays real dividends in high-quality amplifiers where the hum level must be kept to an absolute minimum. Aluminum has good electrical conductivity along

with its non-magnetic properties. For this reason, it makes excellent chassis material.

The chassis shown in Fig. 3 is of all aluminum construction.

An aluminum chassis is to be preferred over steel for two reasons. It has higher electrical conductivity which results in less voltage drop from one point on the chassis to another, hence there is less chance of chassis noise pickup. Since it is non-magnetic, it does not conduct the magnetic field set up by the power transformer which may easily cause high hum level, due to the inductive pickup in low level stages.

6. *Power Transformers of Low Flux Radiation*—It is the magnetic flux from the power transformer that is often the worst offender in amplifier layout and design. If this source can be eliminated at the beginning, the layout problem becomes decidedly easier. Shielded power components confine the magnetic flux to the power transformer proper. Completely encased transformers are to be preferred for this reason over the open or shell type construction.

7. *Vertical Mounting Power Transformers*—Where it is not feasible to use shielded power transformers of low flux density radiation, vertical mounting transformers are to be preferred. They may be more readily turned or rotated for minimum noise level than the half-shell horizontal mounted transformer. The half-shell horizontal mounted transformer introduces much more magnetic flux into the chassis since the chassis virtually becomes a transformer lamination. In steel chassis this flux may extend for several inches. While less serious in aluminum chassis since there is no magnetic conduction, there may be heavy eddy currents set up which may easily introduce considerable hum.

8. *Rotating Low Level Transformers*—Input transformers or other low level transformers, even though of multi-shielded construction, should be capable of at least 120° rotation if minimum hum pickup is to be achieved. Fig. 2 illustrates a low level input transformer of multi-shielded construction.

9. *Grid Return Path*—The grid return path should not carry heater current. Since this lead, whether it is the chassis, bus bar, or a strap, must have at best a small amount of resistance, there will be a minute voltage drop developed due to the heater current flow. This drop appears as an a.c. generator inserted in series with the grid return. The remedy and precaution here is obvious. Even though both the heater lead and grid return lead go to ground, separate wires or leads should be used to tie into the common ground point for the stage. All too often this is overlooked because of the temptation and convenience presented by the socket terminals as convenient tie points.

10. *Tube Socket Material* — Mica-filled bakelite, ceramic, or polystyrene sockets are to be preferred in high quality audio equipment. Even bakelite sockets of reputable manufacturers have been the source of noise of both the shot or "scratch" type as well as a.c. hum. In the case of hum, the noise is due to minute leakage currents between the tube pins, particularly from heater to grid. The shot or "scratch" type noise is caused by a variation in the resistance between the socket terminals. This is a most annoying and trying type noise to pin down in servicing or testing. From the manufacturing and wiring viewpoint, the mica-filled bakelite is to be preferred since it has good mechanical stability and does not deteriorate or melt when solder is applied.

11. *Double-Ended Tubes* — While single ended tubes such as the 6SJ7, 6SK7, etc. lend themselves nicely to neat and convenient construction, they do not have the low noise pickup of their double-ended counterparts the 6J7 and 6K7, which have the grid caps on top. The increased hum pickup of the single ended tubes is probably due to the closeness of the grid terminal lead to that of the heater leads with their attendant magnetic field; and to the minute current flow in the base, since at best this material can never be a perfect insulator.

As a rule of thumb, it is advisable to use tubes having grid caps on top in very low level stages. This is particularly true if pentodes are used.

12. *Metal or Glass Tubes*—The use of metal or glass tubes with shields is a question which can usually be best answered as "it is a matter of opinion." Tests have been conducted which show that the glass type tube with a good close fitting shield will give a noise figure within two to three db of the metal counterpart.

13. *Gain Control Shafts and Can-Type Electrolytics*—The gain control shaft may often become a source of noise pickup. This can be eliminated by insulating the shaft and mounting bushing from the chassis by means of insulating washers. The shaft is then connected to the common ground bus bar at the point achieving the greatest hum reduction. Electrolytic condensers, whether they are used for filtering, decoupling, or bypassing, can be, if

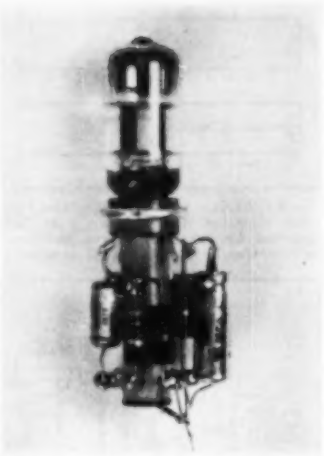


Fig. 1. A turret-type socket with a common ground terminal is suitable for audio work.

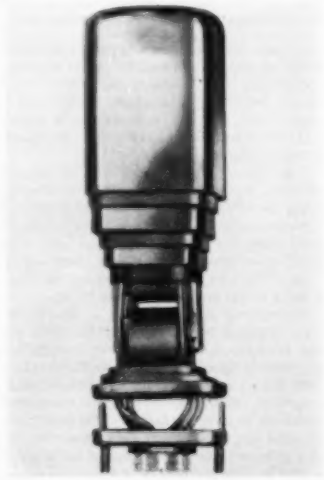
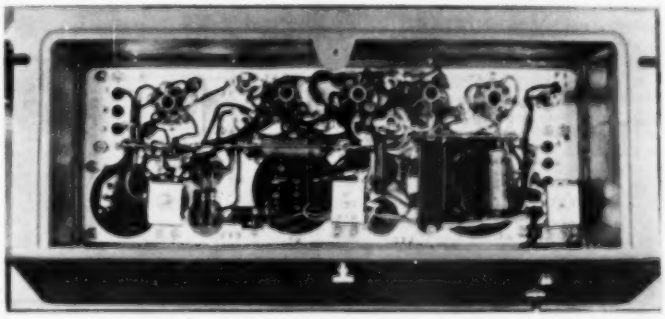


Fig. 2. A multi-shielded input transformer is characterized by minimum hum pickup.

Fig. 3. Broadcast audio amplifier using a common ground bus bar.



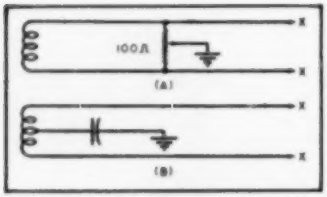


Fig. 4. (A) Hum reduction by varying electrical center of heater supply. (B) Hum reduction by connecting heater transformer center-tap to ground through condenser.

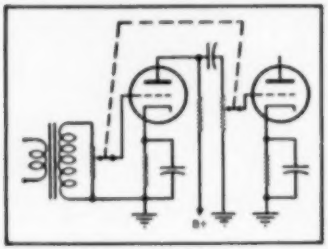


Fig. 5. The use of tandem gain controls for obtaining optimum signal-to-noise level.

they are the metal can type, a source of hum pickup. This can be prevented by mounting the condensers with insulated wafer sockets which insulate the case from ground, permitting a separate wire to be run over to the common ground bus bar.

14. *Turret-Type Sockets*—Turret sockets such as illustrated in Fig. 1 lend themselves nicely to parts layout. The associated resistors and condensers can be mounted right on the socket, affording short leads and isolation. The amplifier illustrated in Fig. 3 uses octal sockets of this type.

Referring again to Fig. 1, the common ground terminal may be seen on the bottom end of the turret assembly. A common ground of this nature combats hum pickup and aids in preventing possible coupling due to common grounds between stages. The common ground lug may then be connected to the ground bus bar as discussed previously in this article.

15. *Heater Center Tap*—As a general rule the heater winding should be grounded by means of the transformer center tap. This precaution often is an absolute must where low level inputs of –60 dbm are encountered. High quality microphones practically always have output levels this low or even lower.

A further improvement can sometimes be made by connecting a 100 ohm potentiometer across the heaters and grounding the center arm as shown in Fig. 4A. When this method is used, obviously the center tap on the transformer filament winding is not grounded. The potentiometer is adjusted for minimum hum level. It is not uncommon to effect a 6 to 8 db reduction in noise. The improvement is not always due to finding the exact electrical center tap for the heater. The potentiometer can be a means of balancing out other hum by outphasing.

Another hum reducing heater center tap scheme which has been used with considerable success in broadcast amplifiers is shown in Fig. 4B. The center tap of the heater winding is connected to ground through a .5 or .25 mfd. paper condenser. The effectiveness of this scheme is largely dependent on the power transformer construction. No definite rule can be given here for its use other than merely "try it," and note if there is a noticeable decrease in hum level. Instances have been observed where this effected as much as a 10 db noise reduction over the usual grounded center tap.

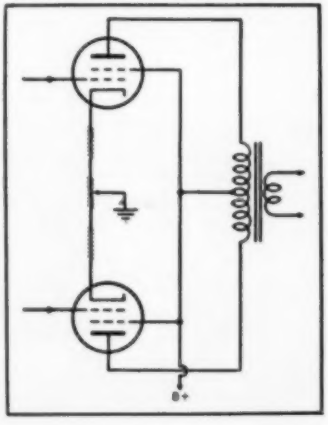
16. *Low Noise Resistors*—Carbon resistors are always a potential source of noise of the hiss or scratching type. In many commercial amplifiers the hiss noise created by the resistors used often is greater than the unavoidable tube hiss noise. While they are much more expensive, wirewound resistors do not introduce this type of noise. However, wirewound resistors are inductive and may introduce hum due to magnetic coupling to a.c. fields.

Obviously, we cannot recommend one brand of resistor over another. A good guide is to follow the broadcast equipment manufacturer's choice. You may be reasonably sure that the brand of resistors he uses in his low level audio equipment is good and has relatively low noise level.

Of one thing you may be sure. Bargain resistors are never a bargain for use in low level audio stages.

17. *Tandem Gain Controls*—Where the amplifier must handle an extremely wide range of input levels, a dual gain control affords an excellent method of maintaining the optimum signal-to-noise ratio. It is usual practice to wire the first section of the control between the input transformer and the first grid and the second section between the first and second stage as in Fig. 5. In practice, as much as 10 db noise reduction may be gained by ganged or tandem gain controls.

Fig. 6. Circuit for a dynamic balancing control to be used with a push-pull output.



Distortion

The causes of distortion are many and would probably fill a book. The following, however, are some of the practical aspects often overlooked by the experienced builder or designer:

1. *Matching of Tube to Output Transformer*—The output transformer must closely match the output impedance of the tube if there is to be a maximum transfer of power. Fortunately, most transformer manufacturers have adopted the policy of stating what tube the transformer will match as well as giving both the primary and secondary impedances. Even this is hardly enough as the values of plate, screen, and bias voltages determine the actual output impedance. For instance, the tube handbook shows that the plate load value for a 6L6 changes from 2500 ohms to 4200 ohms when the plate voltage is increased from 250 to 300, and the grid bias from 14 to 18. From this, it becomes apparent that the transformer must be chosen for a given tube with a given set of operating constants.

In selecting the output transformer, attention should be given to the amount of core material. Transformers having very little "iron" may easily saturate from the high plate current of single ended stages, reducing the effective inductance to a low value. A rough criterion of an output transformer is the size of the core. To be sure, the highest grade of oriented silicon steel requires considerably less size but even this occupies quite a bit of space in a good transformer.

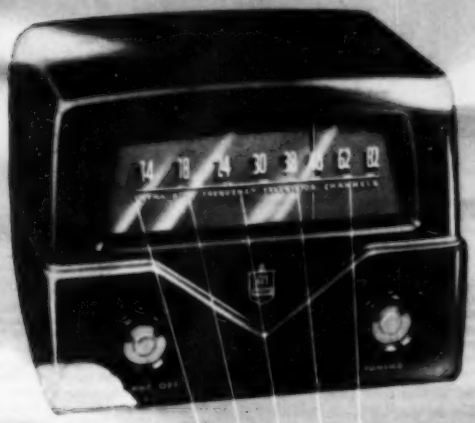
2. *Low Value of Grid Resistors*—High values of grid resistors may cause excessive distortion, and the maximum values given in the tube handbook must never be exceeded. In fact, it is advisable to stay well under this value. The writer knows one well-known audio engineer who uses the rule that the grid return resistance should not be more than five times the value of the plate resistor of the preceding stage. In high quality, wide-response amplifiers, this means the grid resistance would be on the order of 100,000 to 250,000 ohms.

3. *Balancing Cathode Currents*—In output stages, difficulty may be experienced in achieving a dynamic balance due either to a slight off-center center tap on the output transformer or slight differences between the tubes themselves. A small balancing potentiometer connected as shown in Fig. 6 can correct this to a large extent. The potentiometer is not adjusted for equal cathode currents but for minimum distortion when the amplifier is running near its maximum output rating.

4. *Screen Voltage Regulation*—The screen voltage of the output stage requires close attention to its regulation and bypassing. Supplying the screen voltage through a dropping resistor is to be avoided as this forms a very

(*Continued on page 140*)

Adds every UHF Channel . . . to any TV receiver . . .



Mallory UHF Converter

THAT'S RIGHT! The Mallory UHF converter adds *all* UHF channels to *any* TV set . . . in *any* UHF broadcast area. And installation involves only the connection of power lines and antenna leads; no internal adjustments of the receiver are necessary.

Here are the Mallory features that will help you make the most of the new UHF market . . .

- ***Reception of all UHF channels***
- ***No sacrifice of VHF channels***
- ***Built-in UHF antenna***
- ***High quality picture definition***
- ***Fast, easy installation***

The Mallory UHF converter is small, attractive—precision-built to high Mallory standards. For complete information on this versatile converter, contact your Mallory distributor today.



Make Sure . . . Make it Mallory

MALLORY CAPACITORS . . . CONTROLS . . . VIBRATORS . . . SWITCHES . . . RESISTORS . . . RECTIFIERS . . . VIBRAPACK® POWER SUPPLIES . . . FILTERS

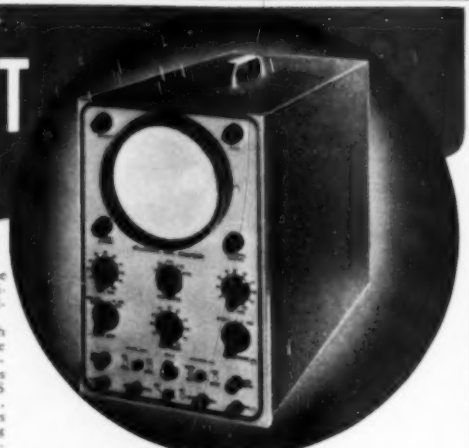
APPROVED PRECISION PRODUCTS

P. R. MALLORY & CO. Inc. INDIANAPOLIS 6, INDIANA

The NEW 1952 Heathkit OSCILLOSCOPE KIT

MODEL O-7
SHIPPING WT. 29 LBS.

$43.50



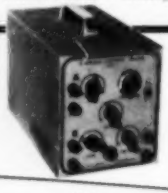
The Heathkit O-7 Oscilloscope with its 10 tube lineup (including CR tube) and carefully engineered circuit using highest quality components is truly the most outstanding scope value on the market today.

The "spot shape" (astigmatism) control working in conjunction with the focus control assures clear, sharp focusing . . . extended sweep range and faster retrace time permits the study of high frequencies . . . step-attenuated frequency-compensated cathode follower vertical input contributes to the excellent frequency response of the vertical channel . . . .03V RMS per inch vertical sensitivity makes weak input signals easy to study . . . push-pull operation of both vertical and horizontal deflection plates reduces pattern distortion . . . specially designed extra-wide CR tube mounting bracket places vertical cascade amplifier, vertical phase splitter, and deflection amplifiers near base of CR tube to reduce distributed wiring capacity and increase high frequency response.

Ideal for TV servicing — steep wavefronts encountered in TV work are easily handled. Fine for production line testing — rugged quality components can stand up under continuous hour-after-hour use. Excellent for laboratories — electrical performance comparable to scopes costing 4 and 5 times as much.

You'll like the complete instructions showing all details for easily building the kit — includes pictorials, step-by-step construction procedure, numerous sketches, schematic, circuit description. All necessary components included — transformer, cabinet, all tubes (including CR tube), completely punched and formed chassis — nothing else to buy.

- **New "spot shape" control for spot adjustment — to give really sharp focusing.**
- **A total of ten tubes including CR tube and five miniatures.**
- **Cascoded vertical amplifiers followed by phase splitter and balanced push-pull deflection amplifiers.**
- **Greatly reduced retrace time.**
- **Step attenuated — frequency compensated — cathode follower vertical input.**
- **New mounting of phase splitter and deflection amplifier tubes near CR tube base.**
- **Increased frequency response — useful to 5 Mc.**
- **Tremendous sensitivity .03V RMS per inch Vertical — .6V RMS per inch Horizontal.**



MODEL S-2

Heathkit ELECTRONIC SWITCH KIT

SHIPPING WT. 11 LBS.

$19.50

The companion piece to a scope — Feed two different signals into the switch, connect its output to a scope, and you can observe both signals — each as an individual trace. Gain of each input is easily set (gain A and gain B controls), the switching frequency is simple to adjust (coarse and fine frequency controls), and the traces can be superimposed for comparison or separated for individual study (position contol).

The kit is complete with tubes, switches, cabinet, power transformer and all other parts, plus a clear detailed construction manual.

NEW Heathkit AUDIO FREQUENCY METER KIT

MODEL AF-1
SHIPPING WT. 15 LBS.



$34.50

The ideal instrument for determining frequencies from 20 cycles to 100 KC. Set the selector switch to the proper range — feed the signal into the input terminals — and read the frequency from the meter. — completely simple to operate, and yet dependable results.

Quality Simpson 200 microampere meter has two plainly marked scales (0-100 0-300). These scales read in conjunction with the seven position selector switch, give full scale readings of 100, 300, 1000, 3000, 10,000, 30,000, and 100,000 cycles. Convenient ranges for fast and easy readings.

For greatest accuracy, the 1-3-10 ratio of ranges is maintained and each range has an individual calibrating control.

A signal voltage anywhere between 2 and 300V can be fed directly into the instrument and a change in signal voltage between these limits will not affect the meter reading. In addition, input wave shape is not critical (the unit will read the frequency of either sine wave or square wave input).

The tube complement consists of a 6SJ7 amplifier and clipper, 6V6 amplifier and clipper, 6H6 meter pulse rectifier, 6X5 power supply rectifier, and OD3/VR150 voltage regulator.

Construction is simple, and quality components are used throughout.

Heathkit INTERMODULATION ANALYZER KIT



MODEL IM-1
SHIPPING WT. 18 LBS.

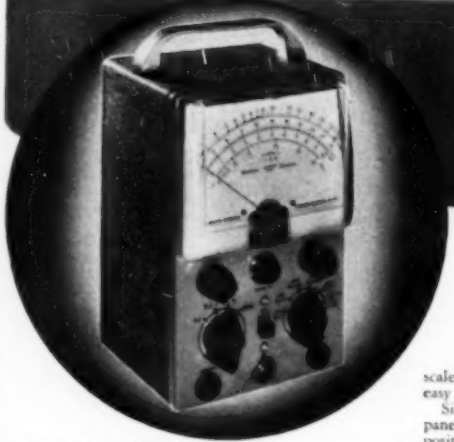
$39.50

Intermodulation testing of audio equipment is rapidly being accepted by more and more engineers and audio experts as the best way to determine the characteristics of audio amplifiers, recording systems, networks, etc.

The Heathkit Intermodulation Analyzer supplies a choice of two high frequencies (approx. 3000 cycles and 7000 cycles) and one low frequency (60 cycles). Both 1:1 or 4:1 ratios of low to high frequencies can be set up for IM testing, and the ratios are easily set by means of a panel control and the instrument's own VTVM. An output level control supplies the mixed signal at the desired level with an output impedance of two thousand ohms. The Analyzer section has input level control and proper filter circuits feeding the instrument's VTVM to read intermodulation directly on full scale ranges of 30%, 10% and 3%. Built-in power supply furnishes all necessary voltages for operating the instrument.

YOU SAVE BY ORDERING DIRECT FROM MANUFACTURER—USE ORDER BLANK ON LAST PAGE





THE *New* 1952 *Heathkit* VTVM KIT

MODEL VS-A
SHIPPING WT. 7 LBS.

$24.50

- New styling — formed case for beauty.
- New truly compact size. Cabinet 4⅛" deep by 4-11/16" wide by 7-3/8" high.
- Quality 200 microamp meter.
- New ohms battery holding clamp and spring clip — assurance of good electrical contact.
- Highest quality precision resistors in multiplier circuit.
- Calibrates on both AC and DC for maximum accuracy.
- Terrific coverage — reads from ½V to 1000V AC, ½V to 1000V DC, and .1 to over 1 billion ohms resistance.
- Large, clearly marked meter scales indicate ohms, AC Volts, DC Volts, and DB — has zero set mark for FM alignment.

Designed to take up a minimum of space, yet designed to be the most important and useful instrument on your workbench. Really handsome looking — note the rounded edges on front panel and rear cover. New compact size has cabinet dimensions of only 4⅛" deep x 4 11/16" wide x 7⅜" high.

Tremendous coverage — will read from ½V to 1000V AC, ½V to 1000V DC, .1 to over 1 billion ohms resistance, and Db. Meter scale has zero-set mark for FM alignment — all scales clearly marked for easy and fast readings and Db scale is in red for easy identification.

Simple to operate. Ohms adjust and zero adjust controls located on front panel along with selector and range switches. Selector switch has four positions: AC, DC−, DC+ and Ohms to set up the instrument for type of reading desired. DC− position allows negative voltages to be taken without reversing test prods. AC and DC voltage ranges are full scale 3V — 10V — 30V — 100V — 300V — 1000V and resistance ranges are RX1, X10, X100, X1000, X10M, X1 Megohm. Convenient ranges for fast and accurate readings.

Strictly highest quality components used throughout — 1% precision resistors in multiplier circuit, Simpson 200 microampere meter movement, sturdy cabinet, excellent positive detent smooth acting switches, etc. New miniature tube used in meter balancing circuit and new battery holding clamp and spring clip assure good contact to ohms string of resistors.

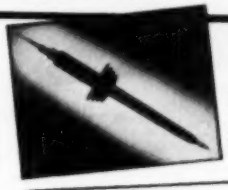
Kit comes complete — and the instruction manual with its step-by-step instructions, pictorials, figures, and schematic makes assembly a pleasure.



Heathkit R F PROBE KIT

Extends range of Heathkit VTVM to 250 MC ± 10%. Designed for taking RF measurements. All parts furnished including probe housing and crystal diode detector. Shipping Weight 1 lb.

$5.50



Heathkit 30,000 V DC PROBE KIT

For taking readings up to 30,000 V DC when used with the Heathkit VTVM (or any standard 11 megohm VTVM). Comes with two color molded plastic probe body and all parts. Shipping Wt. 2 lbs.

$5.50

Heathkit A. C. VACUUM TUBE VOLTMETER KIT



MODEL AV-1
SHIP. WT. 5 LBS.

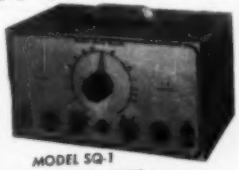
$29.50

Now — as a Heathkit — at a price anyone can afford, an AC VTVM. Makes possible those sensitive AC measurements required by audio enthusiasts, laboratories, and experimentors. The kit audio men have been looking for. Ten ranges consisting of full scale .01, .03, .1, .3, 1, 3, 10, 30, 100, 300 volts RMS assure easy and more accurate readings. Ten ranges on DB provide for, measurements from −52 to +52 DB. Frequency response within 1 DB from 20 cycles to 50 KC.

The ingenious circuitry incorporates precision multiplied resistors for accuracy, two amplifier stages using miniature tubes, a unique bridge rectifier meter circuit, quality Simpson meter with 200 microampere movement, and a clean layout of parts for easy wiring. A high degree of inverse feedback provides for stability and linearity.

Extremely compact, cabinet size — 4-1/8" deep x 4-11/16" wide x 7-3/8" high. Newly designed cabinet makes this the companion piece to the VTVM.

Heathkit SQUARE WAVE GENERATOR KIT



MODEL SQ-1
SHIP. WT. 14 LBS.

$29.50

The Heathkit Square Wave Generator is an excellent square wave frequency source with features you won't want to be without. Especially notable is the wide range of the instrument — 10 cycles to 100 kilocycles continuously variable. This wide range makes it useful for television and wide band amplifier work as well as audio experimentation. The output impedance is low, and the output voltage is continuously variable between 0 and 20 volts. Because a multivibrator stage cannot be accurately calibrated, terminals on the front panel can be used for synchronization to an external source should it be desired.

The circuitry consists of a multivibrator stage, a clipping and a squaring stage, and a cathode follower output stage. The power supply is transformer operated and utilizes a full wave rectifier tube with 2 sections of LC filtering.

For a good, wide range, and low priced square wave generator, the SQ-1 just can't be beat.

YOU SAVE BY ORDERING DIRECT FROM MANUFACTURER—USE ORDER BLANK ON LAST PAGE

The HEATH COMPANY
BENTON HARBOR 12, MICHIGAN

Heathkit

SIGNAL GENERATOR KIT



Model SG-6
Shipping Wt. 7 lbs.

$19.50

The new Heathkit Signal Generator Kit has dozens of improvements. Covers the extended range of 160 Kc to 50 megacycles on fundamentals and up to 150 megacycles on useful calibrated harmonics; makes this Heathkit ideal as a marker oscillator for TV. Output level can be conveniently set by means of both step attenuator and continuously variable output controls. Instrument has new miniature HF tubes to easily handle the high frequencies covered.

Uses 6C4 master oscillator and 6C4 sine wave audio oscillator. The kit is transformer operated and a husky selenium rectifier is used in the power supply. All coils are precision wound and checked for calibration making only one adjustment necessary for all bands.

New sine wave audio oscillator provides internal modulation and is also available for external audio testing. Switch provided allows the oscillator to be modulated by an external audio oscillator for fidelity testing of receivers. Comes complete, all tubes, cabinet, test leads, every part. The instruction manual has step-by-step instructions and pictorials. It's easy and fun to build a Heathkit Model SG-6 Signal Generator.

Heathkit

CONDENSER CHECKER KIT

Only

$19.50

Model C-2
Shipping Wt. 6 lbs.



Checks all types of condensers — paper — mica — ceramic — electrolytic. All condenser scales are direct reading and require no charts or multipliers. Covers range of .00001 MFD to 1000 MFD. A Condenser Checker that anyone can read. A leakage test and polarizing voltage for 20 to 500 V provided. Measures power factor of electrolytics between 0% and 50% and reads resistance from 100 ohms to 5 megohms. The magic eye indicator makes testing easy.

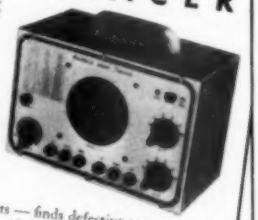
The kit is 110V 60 cycle transformer operated and comes complete with rectifier tube, magic eye tube, cabinet, calibrated panel and all other parts. Has clear detailed instructions for assembly and use.

NEW *Heathkit*

SIGNAL TRACER AND UNIVERSAL TEST SPEAKER KIT

$19.50

Model T-2
Shipping Wt. 7 lbs.



The popular Heathkit Signal Tracer has now been combined with a universal test speaker at no increase in price. The same high quality tracer follows signal from antenna to speaker — locates intermittents — finds defective parts quicker — saves valuable service time — gives greater income per service hour. Works equally well on broadcast, FM, or TV receivers. The test speaker has an assortment of switching ranges to match either push-pull or single output impedances. Also tests microphones, pickups and PA systems. Comes complete: cabinet, 110V 60 cycle power transformer, tubes, test probe, all necessary parts, and detailed instructions for assembly and use.



Model TC-1
Shipping Wt. 12 lbs.

$29.50

Heathkit

TUBE CHECKER KIT

The Tube Checker is a MUST for radio repair men. Often customers want to SEE tubes checked, and a checker like this builds customer confidence. In your repairing, you will have a multitude of tubes to check — quickly. The Heathkit tube checker will serve all these functions — it's good looking (with a polished birch cabinet and an attractive two color panel) — checks 4, 5, 6, 7 prong Octals, Loctals, 7 prong miniatures, 9 prong miniatures, pilot lights, and the Hytron 5 prong types. AND IT'S FAST TO OPERATE — the gear driven, free-running roll chart lists hundreds of tubes, and the smooth acting, simplified switching arrangement gives really rapid set-ups.

The testing arrangement is designed so that you will be able to test new tubes of the future — without even waiting for factory data — protection against obsolescence.

You can give tubes a thorough testing — checks for opens, shorts, each element individually, emission, and for filament continuity. A large BAD-?-GOOD meter scale is in three colors for easy reading and also has a "line-set" mark.

You'll find this tube checker kit a good investment — and it's only $29.50.

YOU SAVE BY ORDERING DIRECT FROM MANUFACTURER—USE ORDER BLANK ON LAST PAGE

The HEATH COMPANY
BENTON HARBOR 13, MICHIGAN

NEW 1952 *Heathkit*

BATTERY ELIMINATOR KIT



Model BE-3
Shipping Wt. 17 lbs.

- **Can be used as battery charger.**
- **Continuously variable output 0 - 8 Volts — not switch type.**
- **Heavy duty Mallory 17 disk type magnesium copper sulfide rectifier.**
- **Automatic overload relay for maximum protection. Self-resetting type.**
- **Ideal for battery, aircraft and marine radios.**
- **Dual Volt and Ammeters read both voltage and amperage continually — no switching.**

The new Heathkit Model BE-3 incorporates the best. Continuously variable output control is of the variable transformer type with smooth wiper type contacts.

There are no switches or steps and voltage between 0 and 8 Volts is available at 10 Amperes continuous and 15 Amperes intermittent. Maximum safety from overloads and shorts provided by automatic overload relay which resets itself when overload is removed.

The new rectifier is a 17 plate Mallory magnesium copper sulfide type. This is the most rugged type available for long trouble-free use.

Output is continuously metered by both a 0 - 10 Volt Voltmeter and a 0 - 15 Amp Ammeter. Shorted vibrators indicated instantly by ammeter.

Equip now for all types of service — aircraft — marine — auto and battery radios — this inexpensive instrument vastly increases service possibilities — better be ready when the customer walks in.

NEW *Heathkit*

SINE AND SQUARE WAVE AUDIO GENERATOR KIT



Model AG-7
Shipping Wt. 15 lbs.

$34.50

Designed with versatility, usefulness, and dependability in mind, the AG-7 gives you the two most needed wave shapes right at your fingertips — the sine wave and the square wave.

The range switch and plainly calibrated frequency scale give rapid and easy frequency selection, and the output control permits setting the output to any desired level.

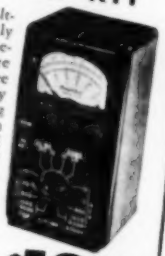
A high-low impedance switch sets the instrument for either high or low impedance output —on high to connect a high impedance load, and on low to work into a low impedance transformer with negligible DC resistance.

Coverage is from 20 to 20,000 cycles, and distortion is at a minimum — you can really trust the output wave shape.

Six tubes, quality 4 gang tuning condenser, power transformer, metal cased filter condenser, 1% precision resistors in the frequency determining circuit, and all other parts come with the kit —plus, a complete construction manual — A tremendous kit, and the price is truly low.

THE NEW *Heathkit*

HANDITESTER KIT



$13.50

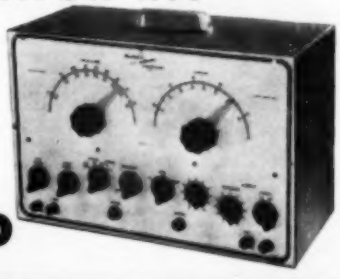
Model M-1
Shipping Wt. 3 lbs.

A precision portable volt-ohm milliammeter. Uses only high quality parts — All precision 1% resistors, three deck switch for trouble-free mounting of parts, specially designed battery mounting bracket, smooth acting ohm adjust control, beautiful molded bakelite case, 400 micro-amp meter movement, etc.

DC and AC voltage ranges 10 - 30 - 300 - 1000 - 5000V. Ohms range 0 - 3000 and 0 - 300,000. Range Milliamperes 0 - 10 Ma, 0 - 100 Ma. Easily assembled from complete instructions and pictorial diagrams.

NEW *Heathkit*

T.V. ALIGNMENT GENERATOR KIT



Model TS-2
Shipping Wt. 20 lbs.

$39.50

Here is an excellent TV Alignment Generator designed to do TV service work quickly, easily, and properly. The Model TS-2 when used in conjunction with an oscilloscope provides a means of correctly aligning television receivers.

The instrument provides a frequency modulated signal covering, in two bands, the range of 10 to 90 Mc. and 150 to 230 Mc — ALL ALLOCATED TV CHANNELS AS WELL AS IF FREQUENCIES ARE COVERED.

An absorption type frequency marker covers from 20 to 75 Mc. in two ranges—therefore, you have a simple, convenient means of frequency checking of IF's, independent of oscillator calibration.

Sweep width is controlled from the front panel and covers a sweep deviation of 0-12 Mc.—all the sweep you could possibly need or want.

And still other excellent features are: Horizontal sweep voltage available at the front panel and controlled with a phasing control—both step and continuously variable attenuation for setting the output signal to the desired level—a convenient instrument stand-by position—vernier drive of both oscillator and marker tuning condensers—and blanking for establishing a single trace with base reference level. Make your work easier, save time, and repair with confidence—order your Heathkit TV Alignment Generator now!

YOU SAVE BY ORDERING DIRECT FROM MANUFACTURER—USE ORDER BLANK ON LAST PAGE

The HEATH COMPANY
. . . BENTON HARBOR 12, MICHIGAN

Heathkit
IMPEDANCE BRIDGE KIT



Model IB-1B
Shipping Wt. 15 lbs.

$69.50

This Impedance Bridge Kit is really a favorite with schools, industrial laboratories, and serious experimenters. An invaluable instrument for those doing electrical measurements work. Reads resistance from .01 Ohms to 10 meg., capacitance from .00001 to 100 MFD, inductance from 10 microhenries to 100 henries, dissipation factor from .002 to 1, and storage factor from 1 to 1000. And you don't have to worry about selecting the proper bridge circuit for the various measurements — the instrument automatically makes the correct circuit when you set up for taking the measurement you want. Bridge utilizes Wheatstone, Hay, Maxwell, and capacitance comparison circuits for the wide range and types of measurements possible. And it's self powered — has internal battery and 1000 cycle hummer. No external generator required — has provisions for external generator if measurements at other than 1000 cycles are desired. Kit utilizes only highest quality parts. General Radio main calibrated control. Mallory ceramic switches, excellent 200 microamp zero center galvanometer, laboratory type binding posts with standard ¾ inch centers, 1% precision ceramic-body type multiplier resistors, beautiful birch cabinet and ready calibrated panel. (Headphones not included.)

Take the guesswork out of electrical measurements — order your Heathkit Impedance Bridge kit today — you'll like it.

Heathkit LABORATORY
RESISTANCE DECADE KIT



$19.50

Shipping Wt. 4 lbs.

An indispensable piece of labratory equipment — the Heathkit Resistance Decade Kit gives you resistance settings from 1 to 99,999 ohms IN ONE OHM STEPS. For greatest accuracy, 1% precision ceramic-body type resistors and highest quality ceramic wafer switches are used.

Designed to match the Impedance Bridge above, the Resistance Decade Kit has a beautiful birch cabinet and attractive panel. It's easy to build, and comes complete with all parts and construction manual.

Heathkit LABORATORY
POWER SUPPLY KITS

Limits:

No load	Variable	150-400V DC
25 MA	Variable	30-310V DC
50 MA	Variable	25-250V DC

Higher loads: Voltage drops off proportionally



$29.50

Model PS-1 Ship. Wt. 20 lbs.

Every experimenter needs a good power supply for electronic setups of all kinds. This unit has been expressly designed to act as a HV supply and a 6.3 V filament voltage source. Voltage control allows selection of HV output desired (continuously variable within limits outlined); and a Volts-Ma switch provides choice of output metering. A large plainly marked and direct reading meter scale indicates either DC voltage output in Volts or DC current output in Ma. (Range of meter 0-500V D.C., 0-200 Ma. D.C.). Instrument has convenient stand-by position and pilot light.

Comes with power transformer, filament transformer, meter, 5Y3 rectifier, two 6E9 control tubes, completely punched and formed chassis, panel, cabinet, detailed construction manual, and all other parts to make the kit complete.

Heathkit
ECONOMY . . . 6 WATT
AMPLIFIER KIT



MODEL A-7
Shipping Wt. 8 lbs.

$14.50

- Choice of 4-8-15 ohm output impedances.
- Response flat ± 1½ db from 20—20,000 cycles.
- 6 watts output.
- Good fidelity at low cost.
- Output tubes working in push pull.
- Volume, bass, and treble controls.
- Two separate inputs.

The purpose of this kit is to provide to the kit builder a low cost amplifier with excellent fidelity. The circuit consists of four tubes with following functions: a 12SL7, one section working as an amplifier and one as a phase splitter, two 12A6 output tubes working in push pull, and a 5Y3 rectifier in a full wave rectifier circuit.

The unit operates from a husky power transformer, and has good output transformer with a choice of 4—8—15 ohm output impedances. (Speaker not included).

The kit provides excellent listening pleasure and the price is really low. Compare it with all others. You won't find a better buy.

MODEL A-7: For tuner and crystal phono inputs. Has two position selector switch for convenient switching to type of input desired.

Model A-7-A: Has a 12SH7 preamplifier stage with special compensation network for operation with reluctance phono input.
Shipping Wt. 8 lbs. **$16.50**

Heathkit
HIGH FIDELITY 20 WATT
AMPLIFIER KIT



MODEL A-8
Shipping Wt. 18 lbs.

$33.50

The A8 (or A-8A) is a high quality amplifier for those who want high fidelity output at moderate cost. Frequency response within ± 1db from 20-20,000 cycles. Distortion at 3db below maximum power output (at 1,000 cycles) is only .8%. Kit has a Chicago power transformer in drawn steel case and a Peerless output transformer with output impedances of 4—8—16 ohms. Bass and treble controls permit listener to select output with tonal qualities of his own liking.

The tube lineup is composed of a 6SJ7 voltage amplifier, a 6SN7 amplifier and phase splitter, two 6L6's in push-pull output and a 5U4G rectifier. All parts furnished (speaker not included) and the construction manual makes assembly easy.

MODEL A-8: For tuner and crystal phono inputs. Has two position selector switch for convenient switching to type of input desired.

MODEL A-8A: Features an added 6SJ7 stage (preamplifier) for operating from variable reluctance cartridge phono pickup, mike input, and either tuner or standard crystal phono pickup. A three position selector switch provides flexible switching. Shipping Wt. 18 lbs. **$35.50**

YOU SAVE BY ORDERING DIRECT FROM MANUFACTURER—USE ORDER BLANK ON LAST PAGE

The HEATH COMPANY
. . . BENTON HARBOR 15, MICHIGAN

Heathkit RECEIVER & TUNER KITS for AM and FM



$19.50

Model BR-1 Broadcast Model Kit covers 550 to 1600 Kc. Shipping Wt. 10 lbs.

Model AR-1 3 Band Receiver Kit covers 550 Kc. to over 20 Mc. continuous. Extremely high sensitivity. Shipping Wt. 10 lbs.

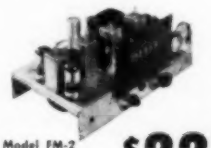


$23.50

TWO HIGH QUALITY Heathkit SUPERHETERODYNE RECEIVER KITS

Two excellent Heathkits. Ideal for schools, replacement of worn out receivers, amateur and custom installations.

Both are transformer operated quality units. The best of materials used throughout — six inch calibrated slide rule dial — quality power output transformers — dual iron core shielded. I.F. coils — metal cased filter condenser. The chassis has phono input jacks, 110 Volt output for phono motor and there is a phono-radio switch on panel. A large metal panel simplifying installation in used console cabinets is included. Comes complete with tubes and instruction manual incorporating pictorials and step-by-step instructions (less speaker and cabinet). The three band model has simple coil turret which is assembled separately for ease of construction.



Model FM-2
Ship. Wt. 9 lbs.

$22.50

TRUE FM FROM Heathkit FM TUNER KIT

The Heathkit FM Tuner Model FM-2 was designed for best tonal reproduction. The circuit incorporates the most desirable FM features — true FM.

Utilizes 8 tubes: 7E5 Oscillator, 6SH7 mixer, two 6SH7 IF amplifiers, 6SH7 limiter, two 7C4 diodes as discriminator, and 6X5 rectifier.

The instrument is transformer operated making it safe for connection to any type receiver or amplifier. Has ready wound and adjusted RF coils, and 2 stages of 10.7 Mc IF (including limiter). A calibrated six inch slide rule dial has vernier drive for easy tuning. All parts and complete construction manual furnished.



MAIL TO THE
HEATH COMPANY
BENTON HARBOR 15, MICHIGAN

ORDER BLANK

From _____

SHIP VIA
- ☐ Parcel Post
- ☐ Express
- ☐ Freight
- ☐ Best Way

Quantity	Item	Price	Quantity	Item	Price
	Heathkit Oscilloscope Kit — Model O-7			Heathkit H.V. Probe Kit — No. 336	
	Heathkit VTVM Kit — Model V 5-A			Heathkit R.F. Signal Gen. Kit — Model SG-6	
	Heathkit FM Tuner Kit — FM-2			Heathkit Condenser Checker Kit — Model C-2	
	Heathkit Broadcast Receiver Kit — Model BR-1			Heathkit Handitester Kit — Model M-1	
	Heathkit Three Band Receiver Kit—Model AR-1			Heathkit Power Supply Kit — Model PS-1	
	Heathkit Amplifier Kit — Model A-7 (or A-7-A)			Heathkit Resistance Decade Kit — Model RD-1	
	Heathkit Amplifier Kit — Model A-8 (or A-8A)			Heathkit Impedance Bridge Kit — Model IB-1B	
	Heathkit Tube Checker Kit — Model TC-1			Heathkit A.C. VTVM-KIT — Model AV-1	
	Heathkit Audio Generator Kit — Model AG-7			Heathkit Intermodul. Analyzer Kit—Model IM-1	
	Heathkit Battery Eliminator Kit — Model BE-3			Heathkit Audio Freq. Meter Kit — Model AF-1	
	Heathkit Electronic Switch Kit — Model S-2			Heathkit Square Wave Gen. Kit — Model SQ-1	
	Heathkit T.V. Alignment Gen. Kit — TS-2				
	Heathkit Signal Tracer Kit — Model T-2				
	Heathkit R.F. Probe Kit — No. 309				

On Parcel Post Orders, include postage for weight shown and insurance. (We insure all shipments.)

On Express Orders, do not include transportation charges — they will be collected by the Express Agency at time of delivery.

Enclosed find ☐ Check ☐ Money Order for _____

Please ship C.O.D. ☐ Postage enclosed for _____ lbs.

ALL PRICES SUBJECT TO CHANGE WITHOUT NOTICE

ROCKE INTERNATIONAL CORP
NEW YORK CITY

The HEATH COMPANY
. . . BENTON HARBOR 15, . . . MICHIGAN

WHAT'S *New in Radio*

For additional information on any of the items described herein, readers are asked to write direct to the manufacturer. By mentioning RADIO & TELEVISION NEWS, the page, and the issue number, delay will be avoided.

CABINETS AND KITS

G & H Wood Products Company, 75 North 11th Street, Brooklyn 11, New York now has available a new equipment cabinet which will accommodate



any *Webster*, *Garrard*, or *Rek-O-Kut* changer and any combination of standard tuners and amplifiers. The tuner compartment measures 20" high by 21¾" wide, and 15¼" deep.

The companion bass reflex cabinet has a volume of approximately 6 cubic feet. The speaker baffle is pre-cut for 12" or 15" speakers.

The over-all dimensions of each unit are 33½" high, 23" wide, and 16" deep. They are constructed of ¾" thick fir plywood. All of the cabinets are supplied unfinished. The assembled units come sanded, ready for finishing while the kits are supplied ready for assembling.

ANTI-STATIC COMPOUND

Merix Chemical Company, 1021 E. 55th Street, Chicago 15, Illinois has developed a new anti-static compound which is especially suitable for plastic dial windows, television lenses, Vinylite and plastic records, color discs for color TV, and plastic radio and television cabinets.

Designated as #79, the new compound is said to keep plastic surfaces free from static charges for many months. The compound is non-inflammable, dries fairly fast, and is practically invisible when dry.

A data sheet on this new product is available from the company on request.

RECORD-PLAYBACK HEAD

The Indiana Steel Products Company, Valparaiso, Indiana has introduced an improved high output record-playback head which is designed to provide high fidelity sound reproduction from ordinary ¼" magnetic coated recording tape.

The TD-704 head has a frequency response flat within 1 db from 100 cycles to 7000 cycles at a tape speed of 7.5 inches-per-second. At a tape speed of 15 inches-per-second, the maximum frequency response is increased to nearly 12,000 cycles. Signal output is on the order of 5 millivolts.

The new unit utilizes a track width of .200" assuring maximum output and signal-to-noise ratio and a constant over-all level of the playback signal. Impedance is 1000 ohms at 1000 cps.

Descriptive literature is available on the TD-704. Write direct to the company for copies.

CORNER HORN ENCLOSURE

Permoflux Corporation, 4900 W. Grand Avenue, Chicago, Illinois is now marketing a corner horn enclosure for an eight-inch speaker.

Special features of the new unit include a smooth over-all response, decreased distortion because the speaker's cone is limited in its travel due to proper loading, and corner-type construction which reinforces the tonal qualities of the unit to give a performance curve from a low of 30 cycles to a high of 12,000 cycles.

Although specifically designed to house the company's "Royal Eight" speaker, the enclosure can be used with other eight-inch speakers. The



unit is designed to fit in the corner of a living room, den, or study, although it can be used in any position.

The cabinet is available in two finishes, blonde and mahogany. The console stands 25" high and is 20" wide by 11" deep.

BATTERY TAPE RECORDER

Amplifier Corp. of America, 398 Broadway, New York 13, New York is now in production on a new battery-operated midget tape recorder which has been tradenamed the "Interviewer."

Designed to simplify recording of interviews and conferences, the new unit carries its own power supply of small dry-cell flashlight batteries so that it can be operated anywhere, irrespective of available power supply. An unusual feature is its detachable non-directional microphone which plugs directly into the microphone input jack, and is supported by its own rigid tubing. An auxiliary table stand, complete with extension cable, is also available.

The recorder is housed in a two-tone leatherette-covered cabinet, measuring



11½" x 8½" x 5½" and weighing 9¾ pounds, including batteries.

Technical specifications on the "Interviewer" are available on request.

COOLING DEVICE

Condor Radio Mfg. Co., 116 N. Montezuma Street, Prescott, Arizona is now marketing a new cooling device for various types of electronic apparatus.

The "Cooler" is used to conduct heat generated by tubes, resistors, etc. to a suitable heat sink, such as the front panel or outside skin of the equipment, thus reducing the temperature rise inside the equipment and prolonging component life.

The unit consists of refrigerant sealed inside a short length of metallic tubing, with a mounting plate at each end. The conductivity above room temperature (25 degrees C) is about ten times that of solid copper. Below room temperature the conductivity decreases producing a gradual thermostatic action.

A data sheet on the new "Cooler" is available from the company on request.

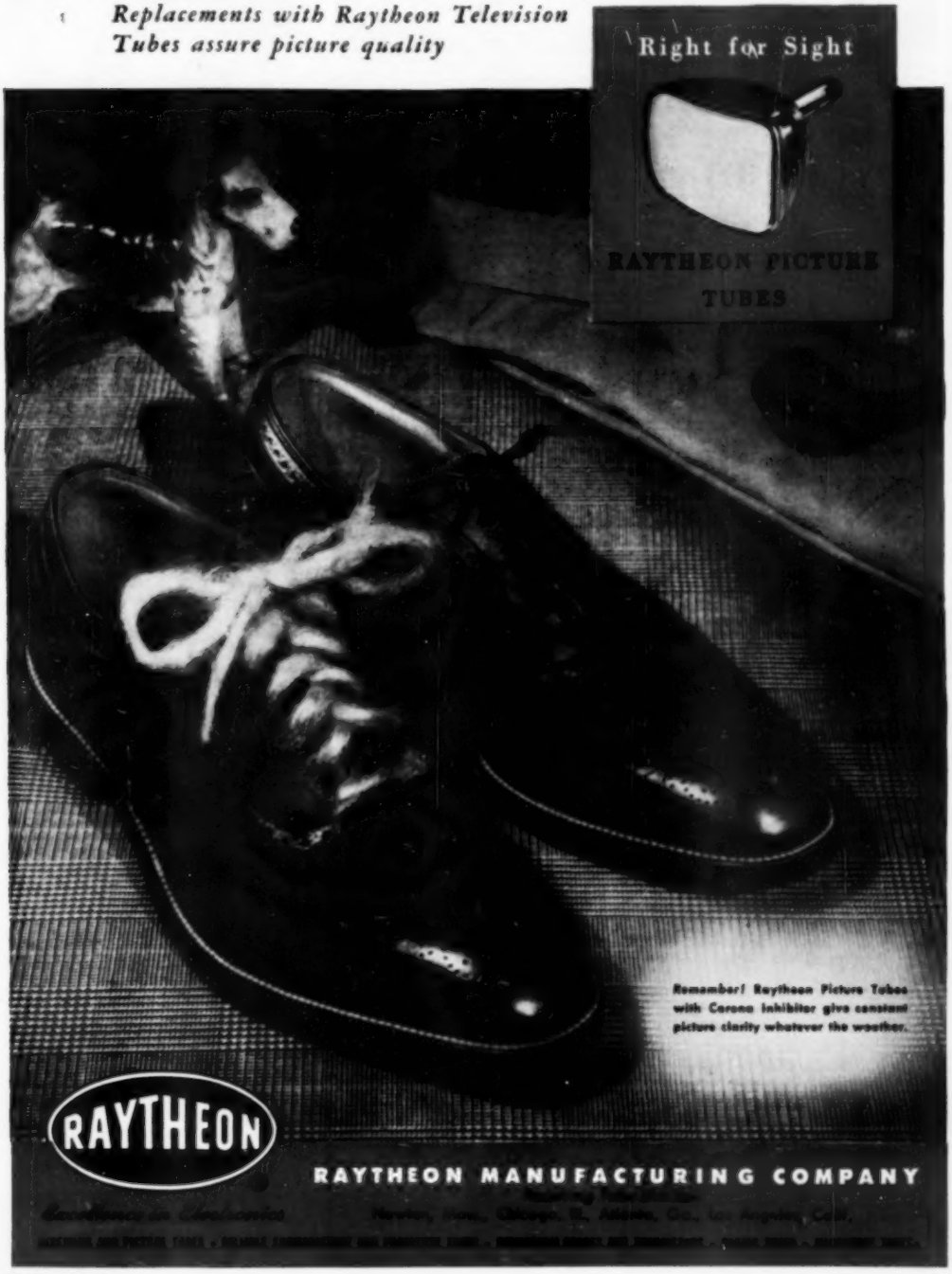
"SUPER-TWEETER"

Jensen Manufacturing Company, 6601 S. Laramie Avenue, Chicago 38, Illinois has developed a new high frequency unit which makes a three-way system out of any coaxial speaker or a two-way system out of a single unit direct radiator.

The RP-302 "super-tweeter" is adapted from the high-frequency channel of the *Jensen* G-610 triaxial speaker. Installation is simple, the unit sits on top of the cabinet or mounts flush on the baffle or panel in a $1\frac{11}{16}$" hole.

Makeshift replacements...reduce picture quality

Replacements with Raytheon Television Tubes assure picture quality



KEY ELECTRONICS

EVERYTHING you buy from KEY is fully guaranteed. If you are not satisfied you may return your purchase for credit or refund as you prefer. NO questions asked. All merchandise offered subject to prior sale. Minimum order $2.00. All prices are FOB Baltimore, Maryland. Shipment will be made by Railway Express Collect unless otherwise specified. Include 25% with all COD orders. The prices shown in this ad supersede all previously published prices.

SAMSON TANZIAN TUNERS. Uses 1-4C4, 2-6AG7, Good condition. As is, less tubes 2.98 ea.

FILTER CHOKES

Stock No.		Price Ea.
647	5.6 Henries, .085A., 80ΩT. DC.	90.99
704	5.0 Henries, .090A., 90ΩT. DC.	98
8350	10.0 Henries, .225A., 500Ω DC. Westinghouse, Tuffy-roll, Insulated	4.98

TANK CIRCUIT. 175-200 Mc. Uses 2-6J6's. In Metal shield box, complete w/tubes 67.95 ea.

TRANSFORMERS. 117 V., 50-60 C. Primaries

Stock No.	Description	Price
1170	Sec. #1 6.3V C.T. @ 1.25A. Sec. #2 6.3V @ 2.2A. Sec. #3 2.5V @ 3A Jefferson	$4.95
1180	Sec. #1 1450 V. C.T. @ 100A. Sec. #2 6.3V @ 4.2A. Sec. #3 2.5V @ 3A Jefferson	9.98
6305	Sec. #1 6.3V @ 10.0A. Sec. #2 6.3V @ 1.5A. Sec. #3 2.5V @ 3A C.T. Sec. #4 6.3V @ 1.5A C.T. Westinghouse, Tuf-flex, Insul. Insulated	7.95
1155	Sec. #1 4000V @ .025A Jefferson	6.50
1157	Sec. #1 6.3V @ 10.0A. Sec. #2 2.5V @ 1.75A Jefferson	9.75

AUDIO OUTPUT TRANSFORMERS

200 V. Insulation. 60 ma primaries. Secondaries match 3.2 ohms nominal.

Stock No.	Primary Impedance	Price Ea.
630	1,100 ohms with barking winding	$0.39
631	2,000 ohms	.49
632	2,400 ohms with barking winding	.59
633	3,500 ohms	.49
634	2,500 ohms with barking winding	.59
635	5,000 ohms	.49
636	6,000 ohms	.49
868	8,000 ohms	.49

AMP "Champ" Hand Tool

Shears bolts and machine screws!
Cuts and strips wire!
Crimps solderless terminals!

$3.95 Cash
postpaid in U.S.A.

OIL-FILLED CAPACITORS

Capacity	Voltage	Price ea.
1 mfd	1,000 V.D.C.	$0.59
2 mfd	1,000 V.D.C.	1.49
2.5 mfd	220 V.A.C.	.60
4 mfd	5,000 V.D.C.	6.95
6 mfd	1,000 V.D.C.	3.29
7 mfd	220 V.A.C.	1.39
7 mfd	600 V.D.C.	2.69
8 mfd	1,000 V.D.C.	3.69
8 mfd	330 V.A.C.	2.75
10 mfd	600 V.D.C.	3.69
10 mfd	660 V.D.C.	3.95
16 mfd	330 V.A.C.	3.98

PAPER CAPACITORS, TYPE TTR
.0012 mfd. .005 mfd. .01 mfd.
10 for $0.49
100 for 1.65
1,000 for 15.00

			Price Ea.
1.0 mfd	400 V.D.C.	C.D. BM4100	.35
2.0 mfd	400 V.D.C.	C.D. BM4200	.49
4.0 mfd	400 V.D.C.	C.D. BM4400	.89

FP CAPACITOR
40-50-10-10 mfd. @ 300-350-350-300 V.D.C.W.V. $1.00 each.

MICA CAPACITOR
Aerovox type 1400, .005 mfd. 500 V.D.C.W.V. 10 for $1.00, postpaid in U.S.A.

ATTENTION INDUSTRIAL USERS!!!!
We have large stocks of the following items:
Aerovox Capacitors
TYPE "G" CAPACITORS
Allen Bradley Potentiometers
E & F "Ma-Kon" Terminals
Tube Sockets
High-vacuum and Gas-filled Condensers
Compression Type Trimmer Condensers
Magnet Wire
AMP Terminals
Bakelite Strips
Fiberglass Yarn
We invite your inquiries. We will reply the same day your query is received.
Write, wire, or phone.
Phone No. Wilkens 6300

Key Electronics Division
1801 N. LONGWOOD ST. BALTIMORE 16, MARYLAND

Concertone
MAGNETIC TAPE RECORDERS



"just like being there"

THE ONLY low cost high fidelity tape recorders delivering professional performance. Professional users' net prices begin at

$345.00

Write for Bulletin 102
Manufactured By
Berlant Associates
4917 W. Jefferson Boulevard
Los Angeles 16, California

Trav-Electric
miniature
Converter
Input 6 Volts D.C.—
Output 110 V. 60 Cycle 40 Watts



$15.95
List Price

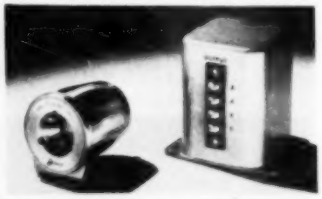
Size—
2½"x2½"x3½"

Operates—
- Radios—Short and Broadcast Band
- Phono—Turntables
- Small Dictating Machines
- Test Equipment
- Electric Shavers
- Incandescent Lights

Just Plug in Cigar Lighter
THOUSANDS IN USE
Fully Guaranteed

See Your Dealer or Jobber—or Write Direct
TERADO CO. 1068 RAYMOND AVE. ST. PAUL 8, MINN.

The new unit provides highs from 4000 cycles up, extending the range to the limits of audibility (approximately



18,000 cycles) with extremely low distortion. A small "Hypex" horn disperses the sound with a useful coverage angle of 120 degrees in the horizontal and vertical planes. A special plastic diaphragm prevents break up.

Complete information on the RP-302 is available from the company. Please request Form DZ.

PORTABLE V.T.V.M.

American Chronoscope Corporation, 316 W. First Street, Mount Vernon, New York is now marketing a portable v.t.v.m. which has been designated the Model 601.

The unit is a self-contained universal test instrument which is battery-operated and requires no external source of power. The meter measures a wide range of a.c. and d.c. voltages, resistances, and currents. It has six d.c. voltage ranges from 3 to 1200 volts full scale, five a.c. ranges from 3 to 300 volts full scale, six resistance ranges covering from 1 to 100 meg-



ohms, and six current ranges reading from 3 to 1200 ma. Input impedance is 13 megohms on the d.c. voltage scales and 6 megohms on the a.c. range.

The entire unit measures 10" x 6⅝" x 5⅝". Battery life is better than 100 hours at normal operation.

MOBILE ANTENNA

To reduce the breakage encountered in high-mounted mobile antenna installations such as on busses and trucks, *Ward Products Corp.*, 1523 East 45th Street, Cleveland 3, Ohio has introduced the new Model SPPC-88 mobile antenna.

The antenna consists of three basic parts. The whip has a coil base serving both as a spring and part of the whip. This section matches a friction-

free spring, effectively providing two springs for maximum flexibility and permitting a minimum clearance when deflected only 4 inches. At the base of the assembly is a junction box that contains a series condenser to assure good match to regular 50-ohm coaxial cable.

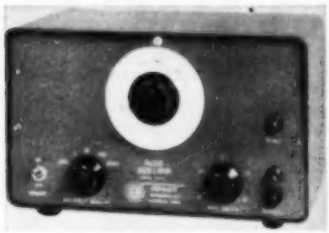
TEST RECORD

Clear-View Television, Inc., 5542-44 Ridge Avenue, Philadelphia 28, Pa. is now merchandising a 45 rpm test record with a large center hole for the adjustment of *RCA* record changers.

According to the company, by using this record the over-all performance of the changer can be checked rapidly and accurately. The "Kwik-Disc" takes approximately 15 seconds to run through its cycle. It is made of unbreakable vinyl and a stroboscope is incorporated in the label, indicating the correct speed. No modulation is used since it is not normally required.

AUDIO OSCILLATOR

A new audio oscillator, designed especially for engineering, research, and production work, has just been released by *Krohn-Hite Instrument Company* of 580 Massachusetts Avenue, Cambridge 39, Mass.



The Model 430-A covers the frequency range from 4.5 to 520,000 cps in five over-lapping bands. A single scale logarithmic dial is used. Calibration is held to ± 2% accuracy.

Two output terminals are provided. The voltage on one of them is controlled by a calibrated output level control while the other provides a fixed sine-wave signal for scope synchronization.

Other features include low distortion and hum at any setting of the output level control and good amplitude constancy over the entire frequency range. A descriptive booklet on this unit is available on request.

NEW V.T.V.M.

Freed Transformer Company, Inc., 1718 Weirfield Street, Brooklyn 27, New York has developed a new vacuum-tube voltmeter which is now being offered to the trade.

Designated as the No. 1040, the new unit is a high-impedance, wide-frequency range voltmeter which can be used at audio and ultrasonic frequencies. The instrument is composed of a high impedance, precision five-step attenuator, an *RC*-coupled multistage amplifier, a balanced rectifier, a balanced d.c. amplifier, and a special meter in which deflection is proportional to the logarithm of the current through it. A high amount of degeneration is used in both the a.c. and d.c. amplifiers. The switching from one voltage range to another is accomplished in the input circuit.

Complete specifications on the No. 1040 may be obtained from the company direct.

PERMANENT REACTIVATOR

Crest Laboratories, Inc., Whitehall Building, Far Rockaway, New York has recently introduced a plug-in type cathode-ray tube rejuvenator which is designed to be permanently wired into the television receiver.

The new unit is compact and may be installed without soldering or lead hookup. By means of a uniquely-designed autotransformer, the input volt-

(*Continued on page 86*)

EBCO

Mfrs. of PICTURE TUBES and ELECTRONIC EQUIPMENT

Sold only thru Radio Parts Jobbers

17" Rectangular C.R.T. .....net with Glass Allowance **$21.95**

20" Rectangular C.R.T. .....net with Glass Allowance **$29.95**

Prices include tax

EIGHTEEN MONTHS GUARANTEE!

"EBCO" *Dual-Purpose*

CHECKER-REACTIVATOR

for TV Picture Tubes

A MONEY MAKER FOR SERVICEMEN:

Check picture tubes for shorts, cathode emission, leakage, etc., without removing tube from TV set. Also **PUT NEW LIFE** into weak tubes with the **REACTIVATING** power of this instrument. Lightweight, portable; 110V-60 cycles. **Fac-tory-guaranteed.** *ASK YOUR JOBBER.*



Model 10 net **$19.95**

Dynamic Analyzer

for TV Picture Tubes

NEW—EBCO Dynamic Analyzer makes your Vacuum Tube Voltmeter **the finest CRT Tester.** It's the ONLY instrument that performs all vital **dynamic** tests: Checks all **socket voltages;** checks **emission** of tube; gives **related emission;** checks **open elements, shorted elements, leakage.** Patented. **FREE — Service Engineer's Manual** for CRT Testing, with each instrument. **NET** only..



$7.95

2-SET CONNECTORS

Two-set Connector for TV.....Net **$2.95**

Four-set Connector, operates 3 or 4 sets from 1 antenna.....Net **4.95**

ASK YOUR JOBBER!

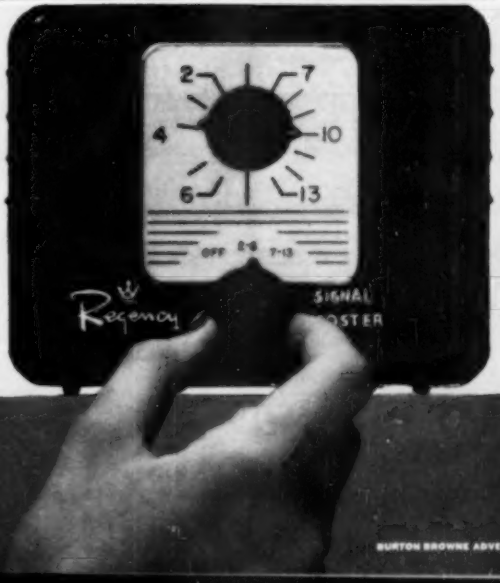
ELECTRONIC BEAM CORP.

EBCO

923 Old Hepperhan Ave.
YONKERS, N. Y.
Phone: YOnkers 3-3514

Largest Selling Booster

AT ANY PRICE !



Regency

BURTON BROWNE ADVERTISING

Picture Proven!



*U. S. PATENT NO. 23,375

RECOGNIZED PERFORMANCE

Even after four years in the highly competitive television market, in which many antennas have come and gone, the Amphenol Inline Antenna is still recognized as the best all-channel TV antenna. Proven by every mechanical and electrical test, the Inline Antenna is established as the *quality* TV antenna on the market today!

Point by point, even when compared with competitive manufacturers' own test data, the Amphenol Inline is indisputably the superior TV antenna.

see this Book . . .

For a complete presentation of the various types of antennas, their test reports and performance charts. Your Authorized Amphenol Distributor has a free copy of this book for you, get yours today!



AMPHENOL

AMERICAN PHENOLIC CORPORATION
1830 SOUTH 54th AVENUE • CHICAGO 50, ILLINOIS

TVI TROUBLE AHEAD

Service technicians and amateurs have a new interference problem on their hands with the opening of the 21-mc. ham band.

A NEW and particularly troublesome problem currently faces ham radio operators and TV set owners since the opening of the new 21-mc. amateur band on May 1st.

Although it is too early to determine the volume of complaints which will result, serious repercussions are expected because of the great number of television receivers, now in the hands of the public, whose i.f. frequency falls in the 21-mc. band. Although many manufacturers have now switched to higher i.f.'s, this move upwards will not help set owners who have older model receivers in their homes.

Specifically, ham transmitters operating in the 21-mc. band are capable of entirely disrupting television reception in nearby receivers having a 21 mc. i.f. even though the ham transmitter is properly shielded and TVI-proofed. One solution will be for service technicians to realign the i.f. to a slightly higher frequency to eliminate the 21-mc. interference. Another solution is to use a 21-mc. wave trap at the receiver antenna terminals. This will trap the interference at this point.

Although the opening of the 21-mc. band to ham transmissions has been expected for several years, the "go-ahead" has caught vast segments of the industry off guard. Not only will hams in the United States be operating on the new band, but amateurs in Canada, New Zealand, Belgium, Ecuador, and Denmark will begin transmissions in this portion of the frequency spectrum within the next month or so.

At first the authorized transmissions will be by code which will have the effect of temporarily blanking out the television signal or causing extreme variations in picture brightness. Later when phone transmissions are authorized for this band, the television set owner may encounter sound bars on his television screen, or possibly the amateur signals in the audio section.

In anticipation of the hue and cry that will arise from millions of TV set owners, the *ARRL* has written to each manufacturer reminding him of the opening of the new 21-mc. band and soliciting his cooperation in disseminating the correct servicing information to combat the new interference problem. This cooperation will do much to reduce complaints.

As there is virtually no likelihood that the new band will be withdrawn from amateur service, since it was established as a result of an international agreement, the burden of coping with the new problem will rest squarely on the shoulders of the manufacturers and the service technicians handling set maintenance. The solution of this problem is relatively simple.

This is by way of warning to service technicians to be on the lookout for this new interference source and a general hint on how the condition will have to be handled. In this specialized case the ham transmitter is not at fault since it will, presumably, be operating within a legally assigned band. All of the procedures necessary to eliminate TVI will have to originate at the receiver rather than at the transmitter.

-30-



ADD TECHNICAL TRAINING TO YOUR PRACTICAL EXPERIENCE

GET YOUR FCC LICENSE IN A HURRY!

Then use our Amazingly Effective JOB-*FINDING* SERVICE

Get this Valuable Booklet FREE

Money-Making FCC Commercial Radio Operator LICENSE Information

TELLS HOW YOU CAN GET A FREE TELEVISION ENGINEERING COURSE

TELLS HOW—

WE GUARANTEE

TO TRAIN AND COACH YOU AT HOME IN SPARE TIME UNTIL YOU GET

YOUR FCC LICENSE

If you have had any practical experience—Amateur, Army, Navy, Radio repair, or experimenting.

TELLS HOW— **Employers make**

JOB OFFERS Like These to Our Graduates Every Month

Letter from Chief Engineer, Broadcast Station, North Carolina, "Need men with radiotelephone 1st class license, no experience necessary. Will learn more than at average station for we are equipped with Diesel Electric power, transmitting and studio equipment."

Telegram from Chief Engineer, Broadcast Station, Wyoming. "Please send latest list available first class operators. Have November 10th opening for two combo men."

These are just a few examples of the job offers that came to our office periodically. Some licensed radiomen filled each of these jobs . . . it might have been you!

HERE'S PROOF FCC LICENSES ARE OFTEN SECURED IN A FEW HOURS OF STUDY WITH OUR Coaching AT HOME in Spare Time.

Name and Address	License	Lessons
Lee Worthy, 2216½ Wilshire St., Bakersfield, Calif.	2nd Phone	16
Clifford E. Vogt, Box 1016, Dania, Fla.	1st Phone	20
Francis X. Fuerch, 38 Beaver Pl., Bergenfield, N. J.	1st Phone	38
S. Sgt. Ben M. Davis, 317 North Roosevelt, Lebanon, Ill.	1st Phone	28
Albert Schoel, 110 West 11th St., Escondido, Calif.	2nd Phone	23

CLEVELAND INSTITUTE OF RADIO ELECTRONICS
CARL E. SMITH, E.E., Consulting Engineer, President
Desk RN-42, 4900 Euclid Bldg., Cleveland 3, Ohio

TELLS HOW—

Our Amazingly Effective JOB-FINDING SERVICE Helps CIRE Students Get Better Jobs

Here are a few recent examples of Job-Finding results:

GETS JOB WITH CAA

"I have had a half dozen or so offers since I mailed some fifty of the two hundred employment applications your school forwarded me. I accepted a position with the Civil Aeronautics Administration as a Maintenance Technician. Thank you very much for the fine cooperation and help your organization has given me in finding a job in the radio field."

Dale E. Young, 122 Robbins St., Owosso, Mich.

GETS FIVE JOB-OFFERS FROM BROADCAST STATIONS

"Your 'Chief Engineer's Bulletin' is a grand way of obtaining employment for your graduates who have obtained their 1st class license. Since my name has been on the list I have received calls or letters from five stations in the southern states, and am now employed as Transmitter Engineer at WMMT."

Elmer Powell, Box 274, Sparta, Tenn.

OURS IS THE ONLY HOME STUDY COURSE WHICH SUPPLIES FCC-TYPE EXAMINATIONS WITH ALL LESSONS AND FINAL TESTS.

GETS CIVIL SERVICE JOB

"I have obtained a position at Wright-Patterson Air Force Base, Dayton, Ohio, as Junior Electronic Equipment Repairman. The Employment Application you prepared for me had a lot to do with me landing this desirable position."

Charles E. Loomis, 4516 Genesee Ave., Dayton, Ohio.

Your FCC Ticket is recognized in all radio fields as proof of your technical ability.



Get All 3 FREE

MAIL COUPON NOW

CLEVELAND INSTITUTE OF RADIO ELECTRONICS
Desk RN-42—4900 Euclid Bldg., Cleveland 3, Ohio
(Address to Desk No. to avoid delay)

I want to know how I can get my FCC ticket in a minimum of time. Send me your FREE booklet, "How to Pass FCC License Examinations"—(does not cover exams for Amateur Licenses), as well as a sample FCC-type exam and the amazing new booklet, "Money-Making FCC License Information."

☐ **Tell me how I can get your Free Television Course.**

Name .....

Address .....

City ..... Zone ..... State .....

Paste on 2-cent postcard or send air mail.



FOR ELECTRONIC COMPONENTS

We offer immediate delivery from our vast stock of more than 25,000 items—all standard make, carefully inspected and fully guaranteed. Our prices are below market.

Always Check Wells' Stock First!

Quotations and quantities available will be given immediately upon request.

ADEL CLAMPS
ANTENNAS
Insulators, Mast Sections
BINDING POSTS
BLOWERS
CABLE ASSEMBLIES
CHOKES
COILS
CONDENSERS
Oil Filled, Bathtub, Hearing Aid, Transmitting Micas, Silver Micas, Ceramic, Variable, Trimmer
CRYSTALS
DYNAMOTORS & BRUSHES
FILTERS
FUSES & MOUNTINGS
GENERATORS
GROUND RODS
HEADSETS
IF COILS
JACKS
JACK BOXES
KEYS, *Telegraph*
KNOBS
LAMPS
LORD MOUNTS
LUGS
MOTORS & BRUSHES
PLUGS
RECTIFIERS
Selenium, Copper Oxide, Meter, Diode
RESISTORS—*All Types*
SELSYNS
SOCKETS
SWITCHES
Aircraft, Micro, Switchettes, Toggle
TIMERS
TUBING—*Flexible*
TUNING SHAFTS
TRANSFORMERS—*All Types*
VIBRATORS
WALKIE TALKIES

Available Now!

A complete signal corps stock number listing of items in our stock. Write for listing No. SG-200. (For government agencies and contractors only.)

Manufacturers and distributors—write for Radio-Electronics Catalog No. H 501.

Write, Wire, Phone Your Requirements

all phones: **SEeley 8-4143**

WELLS SALES, INC.

833 W. CHICAGO AVE., DEPT. R, CHICAGO 22, ILL.

Within the Industry

(*Continued from page 26*)

he joined the company in 1937. He entered the Navy in 1942, serving three years. He became associated with the *Hunter-Douglas Corporation* in 1949 and relinquished this post to rejoin *Westinghouse*. He will maintain headquarters at the company's New York executive offices.

* * *

DONALD W. JACKSON, west coast representative for *Belmont Radio Corporation*, has been promoted to the post of assistant sales manager with headquarters at the Chicago office of the firm.



He was formerly associated with *Goodyear Rubber Company* and joined *Belmont* in 1950 as district manager for the Michigan and Ohio territories. He took on the west coast assignment last year and has since been stationed in Los Angeles.

* * *

ROBERT R. PORTER has been named vice-president and sales manager of the *Ford Instrument Division* of *The Sperry Corporation*. He joined the division in 1949 as assistant to the president . . . **JOHN C. McDEVITT** is the new assistant sales manager of the radio sales section of the *Crosley Division*. He has been with the company since 1949 and will make his headquarters in Cincinnati . . . **DONN F. KING** has been named east central district sales manager of the Parts Division of *Sylvania Electric Products, Inc.* In his new post he will have district sales supervision over all metal, mica, and plastic parts, components, and finished products manufactured by the Parts Division . . . The Television and Broadcast Receiver Division of *Bendix Radio* has named **ARTHUR E. WELCH** to the post of assistant general manager. He was formerly associated with *Raytheon Manufacturing Company* where he held the post of national merchandising manager . . . **DR. LEWIS WARRINGTON CHUBB**, director emeritus of the *Westinghouse Research Laboratories*, died recently at his home in Pittsburgh. He was associated with the company for 42 years, retiring in 1948 . . . **WILLIAM H. GIBBONS** is the new advertising manager of *Tinnerman Products, Inc.* of Cleveland. He joined the company in March 1950 . . . **JOHN J. RADIGAN, JR.** has been placed in charge of industrial relations at *P. R. Mallory & Co., Inc.* with the title of vice-president. He was formerly industrial relations director at the *E. W. Bliss Company* of Canton, Ohio . . . The newly-created post of sales manager for the radio division of *Admiral Corporation* is being filled by **HENRY A. BROWE**. He has been with the company since 1948 . . . **EARLE POORMAN** has joined *William N. Scheer, Advertising*, as vice-president in charge of merchandising. He was formerly associated with *General Electric Appliances, Inc.* of New York . . . **FRED A. LYMAN** has been promoted to the post of national merchandise manager of the receiver sales division, *Allen B. Du Mont Laboratories, Inc.* He was formerly manager of the company's New York factory distributor branch . . . **TOM PAXTON** is now in charge of the distributor operation in Indianapolis, Ft. Wayne, Louisville, St. Louis, and Cincinnati for the *Hallicrafters Company*. He formerly was a Chicago representative for *Zenith Distributing Company* . . . **CHARLES W. HALE** has joined *Star Electronic Distributors, Inc.* of Chicago. He will handle the sale of electronic parts and equipment to industrial accounts . . . **A. M. REPSUMER** has been appointed television supervisor for the *Baker Manufacturing Company* of Evansville, Wisconsin, manufacturer of television masts, towers, and roof mounts. He joined the company in 1950 immediately after his graduation from the University of Wisconsin . . . *Sparton Radio-Television* of Jackson, Michigan, has named **WILLIAM B. FORS** to the post of advertising and sales promotion manager.

* * *

BERNARD L. CAHN, general sales manager of the *Insuline Corporation of America*, has been elected 1952 chairman of the Sales Managers Club, Eastern Division.



Other officers chosen for the year include Jerome Kirschbaum, *Precision Apparatus Co., Inc.*, vice-chairman; Walter Jablon, *Espey Manufacturing Company*, secretary; and Vincent Ulrich, *National Union Radio Corporation*, delegate to the industry's show corporation board.

The Sales Managers Club is an association of executives of electronic parts and equipment manufacturers, dedicated to the improvement of industry relations. It is one of the sponsors of the annual Parts Show. —30—

AMPLIFIER NOTES

FREDERIC T. C. BREWER has forwarded some additional notes regarding his article "A Low-Cost Audio Amplifier" which appeared in the March issue.

Mr. Brewer suggests that the volume control be insulated from the utility box with fiber washers and then grounded through the secondary of the output transformer.

He points out that if the control is not insulated there is a tendency for the amplifier to oscillate at some settings of the volume control.

Readers who have built this unit and have experienced difficulty with oscillation will be glad to know that they have not made a mistake in wiring. Insulating this control will clear up the difficulty completely. —30—

For the clearest picture of campaign progress...



Rauland PICTURE TUBES

Man, what a year for TV—and TV service profits! The richest menu of regular attractions ever offered to viewers . . . PLUS the party conventions, the campaign, the elections and inauguration! When viewers need replacement picture tubes, they'll want them fast—*and good.*

So remember that Rauland alone offers these replacement profit advantages:

- The *most complete* line of replacement picture tubes . . . a far better supplement for your regular tube line than a second line of receiver tubes.
- The faster, *surer* installation adjustment made possible by the patented Indicator Ton Trap.
- The dependable, uniform *extra* quality that so many smart service men depend on for assured customer satisfaction.

• • •

Remember, Rauland research has developed more "firsts" in picture tube progress since the war than any other maker. And this leadership pays off . . . in your customers' satisfaction.

THE RAULAND CORPORATION

Perfection Through Research

4245 N. KNOX AVENUE • CHICAGO 41, ILLINOIS

New Super-Quality 15-inch COAXIAL SPEAKER Only $24.95

BUY YOUR WIDE-RANGE COAXIAL SPEAKER AT McGEE



NEW 1952 MODEL
12" COAXIAL P.M.
$12.95
WHY PAY MORE?

Below offers the new 1952 model 12" coaxial PM speaker. The finest that we have ever offered. Quality you would put in your finest sets if you were a manufacturer. Genuine Alnico V magnet (12.8 oz. in the gap). The tweeter is especially suspended inside the 12" and has a metal diffused cone. Has high pass filter to prevent it from going the put noise. Instead only two wires to connect to your radio or audio amplifier. Why buy an extension speaker when you can have a 12" coaxial PM for only $12.95? Input 8 ohms with 18 watt peak (10 watts program). Response graph at left. Response from 30 to 17,500 cps. McGee's finest speaker value. Stock No. CC-12C. Sale price, **$12.95** each.



15" COAXIAL P.M. SPEAKER
$19.95

Only $19.95 buys a full 15" 20 watt coaxial PM speaker with built-in high pass filter. Built to any 8 ohm output an radio or amplifier. Response graph below. 40 to approx 17,500 cps. Good bass response. A husky 20 watt magnet makes this price possible. Pull 32 oz. magnet in the woofer, 8" tweeter. Model P15-8. Ship. wt. 11 lbs. Sale price, **$19.95**.



HALLICRAFTERS S-78
11-TUBE FM-AM CHASSIS
ONLY **$89.50** LESS SPEAKER
WITH 12" COAXIAL SPEAKER **$99.50**

★ PUSH-PULL WIDE RANGE AUDIO

Hallicrafters S-78, 11-tube AM-FM radio receiver chassis, with push-pull 6K6 high fidelity audio. A new model with many outstanding features. Full range tuning meter, with lock tuned. Input for automatic record changer. Output transformer has 4 ohm and 500 ohm connections. Chassis size, 12¾ x 10" x 7¾" high. Radio and record player panel. Receiver, standard 19" rack panel, 5¼" high. Shipping weight 21 lbs. Model S-78, priced less speaker at **$89.50** net.

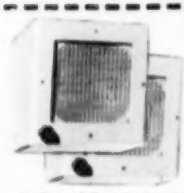
Hallicrafters 12" coaxial PM speaker, built for **$99.50**. Has 15 watt rating. 8 ohm voice coil. Response 40 to 15,000 cps. Model S-78 with 12" coaxial PM speaker, both for **$187.95**.

If you want a record changer, see our special listing below.



DELUXE CAPEHART CABINET $99.95
MADE FOR A $115.00.00 RADIO-PHONOGRAPH

Beautiful, top quality, walnut combination radio-phono cabinet. 42" high, 42" wide and 22" deep. Made for Capehart's finest combination. Highly polished rubbed walnut finish. Cabinet top is 1¼" thick. This cabinet weighs approximately 180 lbs. Both the radio and changer compartments and speaker grill have hinged doors. Radio compartment on the right-hand side is 14" high and 21⅝" wide. Made to mount chassis with 7" depth. The changer compartment is 14" high and 26½" wide. Large enough to hold any record changer or recorder merchandised. Front 19" of top over the changer compartment is hinged to fold back for easy access to the changer. Both radio and changer compartments come with swivel panels. Speaker baffle is cut for a 12" speaker and the compartment is completely ventilated. Shipping weight, 275 lbs., stock No. E-275, Capehart combination cabinet. Net price, **$99.95**.



8" EXTENSION SPEAKER
FOR TELEVISION SETS
RADIO SETS—AND
P.A. SYSTEMS—

$7.95 EACH

★ HAS VOLUME CONTROL
★ LEATHERETTE BAFFLE
★ HEAVY 8" PM SPEAKER

Just imagine all the places you could use an extension speaker. Such as connected to a TV set or radio, or in a recreation room. It's easy—just clip on 2 connectors to the speaker voice coil and your extension speaker is ready to play.

Loudness of the extension speaker may be controlled right at the extension speaker. Speaker is mounted in a leatherette baffle. Speaker is housed in a leatherette covered wood case with volume control and 20 ft. of extension wire. Speaker may be used as a table model. Extra speaker wire, 4¢ per ft. TS Radio extension PM speaker. Stock No. 10-12. **$7.95** ea., two for **$15.00**.



100 Molded Plastic Bypasses **$9.95**

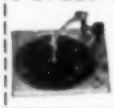
100 molded plastic tubular by-pass condensers. All 600 volt. Assortment of 10 each of well known values. Regular dealers' cost is over two and one-half times our price. Assortment sale price, $9.95. You'll always have a ready supply on hand. Here's what you get: 10—.001, 10—.002, 20—.005, 20—.01, 10—.02, 20—.05 and 10—1 600 volt condensers. Our big deal No. BN-202. 100 Plastic Tubulars. Shipping weight 2 lbs. Net price, **$9.95**.



100 600 VOLT TUBULARS **$6.95**

100 top quality 600 volt tubular by-pass condensers. Made by famous Sprague factory. Don't confuse these with grab-bag surplus. Mcgee's deals are guaranteed to please you. Here's what you get: 10—.001, 10—.002, 20—.005, 20—.01, 10—.02, 20—.05 and 10—1 600 volt condensers. Our big deal No. BN-203. Shipping weight 2 lbs. Net price, **$6.95**.

3-SPEED CHANGERS ON SALE AT McGEE

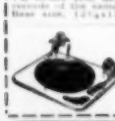


WEBSTER CHICAGO MODEL 100-2 ONLY **$26.95**

For the first time we offer the world famous Webster-Chicago model 100-2. Features a newly designed spindle that drops the records flat after the last record plays. Tonearm with built-in turntable. Picking up needle down automatically after the last record plays. Plays all records, 7", 10" and 12" at 16, 33⅓ and 45 rpm. New tone arm with Electro-Voice 760 A Matic cartridge with dual needles. Universal base. Model 100-2. Stock No. 41. Mcgee offers them for only **$26.95** each. Shipping weight 14 lbs. Base size 12¼x15¾.

V.M. 3-SPEED MODEL 405 $22.95

VM model 400, deluxe 3 speed automatic record changer. Plays them all. Intermixes any combination of 7", 10" and 12" records. Special pickup with 2 sapphire needles. Base size, 12¼x15¾". Shipping weight 12 lbs. VM-400. Net price **$22.95**.

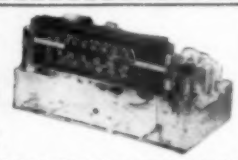


G.I. 3-SPEED CHANGER WITH G.E. VARIABLE RELUCTANCE TURN-ABOUT CARTRIDGE **$22.95**

Another tremendous Mcgee Smash! Brand new General Instrument 3-speed automatic record changer. Complete with RPS 050 G.E. variable reluctance cartridge with turn-about stylus. Plays all 3 speeds automatically. 7", 10" or 12" records. Has reject button. Repeats last record. Base size, 12 5/16x15¾. Shipping weight 14 lbs. stock No. 700-GE. Sweep price, **$22.95**.

New Versatile Espey
12-TUBE FM-AM CHASSIS
$64.50

★ BUILT IN PRE-AMPLIFIER FOR G.E. VARIABLE RELUCTANCE PICKUP
★ WIDE RANGE AUDIO
★ MAY BE USED WITH A CRYSTAL MIKE AS A HOME P.A. SYSTEM



Mcgee's new 1951 model 12 tube FM-AM chassis. Latest design with phono inputs for all types of record players, crystal or G.E. variable reluctance. Receives standard broadcast 530 to 1700 kc and FM 88 to 108 Mc. Wide range audio response (push-pull 7C5) and bass boost tone control. Long antenna for broadcast and FM, universal type antenna, may be stapled to cabinet. Attractive lighted slide rule dial. Chassis size, 11¼x8" high and 6" deep. Shipping weight 7 lbs. Stock No. 7-CK. Made to sell at a much higher price. Mcgee's sale price is **$64.50**. Cabinet to match, 9 tubes. **7-CK** chassis with our 12" coaxial PM, (11.14), both **$76.90**. Espey 7-C chassis, 12 tubes, FM speaker and 3 speed VM changer with G.E. variable reluctance cartridge, **$104.90**.



RADIO-PHONO CABINET
CUT TO FIT ESPEY CHASSIS OR WITH BLANK PANEL **$79.95**

Buy this cabinet with Espey chassis and the VM changer listed above and have a fine radio-phono combination for less than the value of the cabinet alone. This beautiful cabinet was intended for a Crosley 8-50 chassis, but unfortunately, it is the finest possible furniture quality cabinet workmanship. 37" high, 40" wide and 21" front to back. Hinged top lifts in two sections. 25½" lid covers the changer compartment and 14½" is the width of the radio compartment. Changer mounting panel is furnished blank. Radio panel is shipped ready cut to fit the 7-C Espey chassis. Baffle is cut to hold 2 12" speakers. Made of top quality walnut veneer. Tg. material used throughout. Shipped via rail or express only. Shipping wt., 160 lbs. Stock No. C-175, with panel cut to fit Espey 7-C, **$79.95**. Stock No. B-175B, with blank changer and radio panel, **$79.95**. Buy 2 12" 32 oz. Alnico PM speakers for use in this cabinet for only **$49.00** ($7.50 each).



NEW SUPER QUALITY
15" COAXIAL SPEAKER
5" TWEETER
21 OZ. ALNICO V MAGNET
THE FINEST COAX WE HAVE EVER OFFERED
$24.95 TWO FOR $47.95

This is the finest 15" coaxial PM speaker value that we have ever offered. New 1952 production, of a famous manufacturer of loudspeakers. The 15" speaker has a 21¼ oz. Alnico V magnet, equal to 68 oz. of the Alnico 5 type magnet. The cone is full floating, of one piece construction. Will reproduce low frequencies down to 20 cps. The 5" tweeter is specially suspended and has a ridged cone to reproduce only the high frequencies. It will respond up to 17,500 cps. The high-pass filter is concealed under the pot cover, leaving only two wires to connect both the tweeter and woofer to any 8 ohm output transformer of a radio, or high fidelity audio amplifier. Stock No. P15-CK, shipping weight 13 lbs. Net price, **$24.95**, 2 for **$47.95**.

SENSATIONAL 50 WATT BOOSTER AMPLIFIER



ONLY **$39.95**

2 MIKE PRE-AMP **$12.95** EXTRA

50-WATT BOOSTER A sensational value. 50 watt booster amplifier with push-pull parallel 6L6 output tubes. Connect to your present amplifier as a booster or use with the PM-2X Pre-amp to add the use of 2 mikes and one low level input. The booster amplifier has one input jack and with 1 volt input gives 50 watts of audio. Booster has a 6 ch. potted case high fidelity output transformer. Operates on 105 to 125 volt 50 to 60 cycle AC. Has 4 6L6 tubes and one 5U4G rectifier. Booster has 12" of power supply with 5U4 rectifier. Price includes tubes: 4 6L6, 7N7 and 5U4. Two fully variable controls are for master volume control and bass high frequency. Size 8 x 6½ x 14½. Stock No. PA-55X. Shipping weight 20 lbs. Sale price **$39.95** ea.

2-MIKE PRE-AMP. Pre-amplifier plugs in directly to the PA-55X booster amplifier for high fidelity mixer amplifier. Stock No. PM-2X, shipping weight 13 lbs. Net price, **$12.95**. It enables use of 2 Crystal or Dynamic Mike for public address use. Price one low level input. Furnished with 4 foot cables and plugs for remote control of the 55 watt Booster Amplifier. Small chassis size 5 x 3¼ x 4". Stock No. PM-2X, with tubes 7F7 and 7N7. Net price **$12.95**.

TERRIFIC VALUES IN SPEAKERS AND BAFFLES



8" PM AND LEATHERETTE BAFFLE **$4.95**

$4.75 IN LOTS OF 10

The finest Leatherette Baffle we have ever offered. New self-supporting plastic grill material, baffle is covered tan with matching grill. Offered with a good quality 8" PM speaker with 3.2 ohm voice coil. Stock No. 8PM. Speaker and Baffle, **$4.95** ea., lots of 10, **$4.75** ea. Baffle only. Stock No. NV-8, **$2.29** ea., 10 for **$19.95**.

High impedance dynamic mike with 12 ft. of cable for use present. No. 4-DT, **$9.95** ea. 2 Section floor stand, **$5.95** extra.





12" PM AND WALNUT BAFFLE **$9.95**

$8.95 IN LOTS OF 3

The finest built 12" Walnut plywood baffle we have ever offered. Factory cut of the famous Jake ben manufacturer exceeds any baffle we offer with a 12" PM, for little more. You pay only **$9.95** in single lots, or **$8.95** in 3 lots for both a 12" Quam Alnico V PM with 3.2 ohm voice coil and the beautiful walnut baffle. 12" speaker baffle combination, stock No. BS-12Q. **$9.95** ea., lots of 3 **$8.95** ea. 12" Baffle only, 2 @ **$5.95**, **$4.95** each.

McGEE RADIO COMPANY Prices F.O.B. K.C. Send 25% Deposit with Order. Balance Sent C.O.D. With Parcel Post Orders, Include Postage

TELEPHONE VICTOR 9945. WRITE FOR FLYER
1422 GRAND AVE., KANSAS CITY, MISSOURI

★ RED HOT VALUES IN T.V. TUNERS ★

STANDARD COIL CASCODE TUNER $19.95



The Cascode Circuit of the Standard Tuner offers a new development of this famous TV front end assembly which affords a 2-to-1 improvement in gain and a 33⅓% better reduction of noise over the pentode tuner. Other advances include: easy conversion to UHF reception by interchanging channel inductors; increased sensitivity for TV sets in fringe areas; elimination of booster use; and a high profit item for the serviceman as a replacement unit. Brand new factory cartoned. Series TV-2000 TV tuner, complete with tubes 6BK7 or 6BQ7 and a 6J6. Sensational price, each **$19.95**



RCA 201E1 T.V. TUNER $7.95

Terrific buy on this RCA tuner. We have a limited quantity of the famous original 201E1, 13 channel completely wired and tested TV front end tuners. Ready to connect to your TV video I.F. strip. Offered at a sacrifice. Price was $44.95. Now only **$7.95** each, with tubes. Each tuner in good condition but has been repaired. Stock No. RCA-13P. TV front end tuner. Converter coil type for separate sound as used in the famous 630 chassis. Complete with 3—6J6 tubes, **$7.95**. Specify shaft length desired, either 2" or 4".

GENERAL INST. T.V. TUNER $7.95



This popular General Instrument TV tuner has been used on thousands of kit and wired TV sets. It has built-in fine tuning and 12 channel selector control. This tuner differs from other tuners in that it is built around a tuning condenser instead of a coil switching arrangement. A converter coil is not mounted on this tuner. Priced complete with 3—6J6 tubes ..... shipping wt. 3 lbs. Stock No. GI-WTT, with tubes. Net price, **$7.95**. Specify shaft length desired, either 1¾" or 7".

$2.95 SPECIAL. GI-312 same as above GI Tuner only less tubes and in repairable condition. 1¾" and 7" shafts available.

3-TUBE SARKES-TARZIAN T.V. TUNER $9.95



This popular Sarkes-Tarzian Type 3 tuner is widely used. 12 channel rotary type switch with individually tuned coils. Price is complete with diagram and three tubes: 6C4 osc., 6BH6 R.F. and 6AG5 mixer. Regular factory cost is twice our price. Each tuner is wired ready to hook up to a video and sound I.F. strip. May be used with either inter-carrier or separate sound IF circuits. Has built-on converter coil built in fine frequency control. Sarkes-Tarzian TV tuner, with tubes, each. Specify shaft length, either 2¼" or 4½".

COMPLETE 17" TO 20" T.V. KIT



★ AC-TRANS-TYPE
★ CONVENTIONAL CIRCUIT
★ READY WIRED 12 CHANNEL T.V. FRONT END
★ 70° DEFLECTION ★ CERAMIC FLYBACK
★ KIT OF TUBES EXCEPT KINE $16.95 ★ 20HP4 $27.95 EXTRA

$59.95 LESS TUBES

A complete kit of parts to build an AC transformer operated television chassis for use with a 16, 17 or 20 inch picture tube. The 4 channel Sarkes Tarzian tuner is ready wired. The 4 tube video IF strip is also wired. Circuit is of the conventional accepted design, with latest ceramic type flyback high voltage supply. Chassis is ready punched. Warning: do not buy this kit unless you understand T.V. Television and electronics. It is difficult to wire. We furnish schematic and photos. Kit model WH 20 ship weight 40 lbs. less all tubes **$59.95**. Kit of 19 tubes but less picture tube **$16.95** ext. 17 inch 17HP4A **$21.95** ext. 20HP4 **$27.95** ext. 20CP4 rect. tube **$37.00** ext.

GENUINE STANDARD COIL T.V. BOOSTERS



NOT SURPLUS—BUT RIGHT FROM THE FACTORY—ONLY $11.95 EACH—TWO for $22.00

Latest Model B-51 Standard Coil Television Booster. McGee makes another lucky purchase and is wholly passing the saving on to you. The famous Model B-51, 12 channel Standard Coil TV booster, which lists for $35.00, is offered to you for only **$11.95** each. Brand new, factory cartoned and fully guaranteed by Standard Coil. This 2 stage booster utilizes printed high frequency circuits, for improved performance on all channels and 5 or 6 on high channels. No distorting of picture. Has extremely low noise factor. Continuous one-knob tuning and channel selector control switch for all channels. Easy to install. Just plug in between TV set and antenna terminals of set. 8 x 4½ x 4½". Made for 110 volt, 60 cycle AC operation. Shipping weight 3 lbs. Model B-51. Sale price, **$11.95** each, or buy 2 for only **$22.00**.

T.V. FRINGE AREA DEALERS—ATTENTION
FM AND
TELEVISION BOOSTER SALE



ANOTHER McGEE SCOOP
WHY PAY MORE?
NOT A KIT BUT A FACTORY-BUILT BOOSTER

$10.95

Sensational value. Continuously variable inductance type tuner, from channel 2 including the FM band, through channel 13. This booster is self powered for 110 volts AC operation. Incorporates a 6J6 high gain triode. Has 300 ohm TV lead and 300 ohm output to the TV set. Single knob tuning. Attractive plastic case. Molded-in Silver Name Screw TV-FM booster. Stock No. BB-6B. Shipping weight 5 lbs. McGee's terrific sale price, **$10.95** each. **Two for $20.00**.

NOW YOU CAN CONVERT TO A 17" OR 20" PICTURE TUBE WITH ELECTRO STATIC FOCUS



The 17HP4 and 20HP4 are 17" and 20" black face picture tubes of the electromagnetic deflection electrostatic type or focusing. Ion trap magnet is required. The 2nd anode is connected as a booster between ground and the cathode of the damper tube. The arm of the focus pot connects to pin 6 of the 6 BQ6 tube. A voltage of from 0 to 300 volts is required to supply a focus voltage of from 0 to 300 volts. This new type tube is called low voltage electrostatic focus. Very simple to use and operates from 6.3 AC to 14 AC. Several makers are using this new tube in several models. The trend is almost completely to this type gun.

20" CONVERSION KIT $32.95

The new 20HP4 blackface picture tube operates from 10 to 14KV high voltage. It is the conventional 20° rectangular shape 4 speed 70° yoke and single ion trap are required. Focusing is accomplished by electrostatic means, applying from 300 volts or less to the focus anode, pin No. 6. All other connections and characteristics are similar to a 20CP4. No focus coil or focus magnet is needed. You get the 20HP4 tube, a 20" rectangular plastic safety mask with gold trim, plus tube characteristics, all for ..... **$32.95**. Stock No. HPM-20, shipping weight 40 lbs.

17J1-X, Universal flyback with connecting instructions ..... **$3.95**. 70° Deflection Yoke ..... **$2.95**. Width Coil, **99c**. 5 meg. focus control, **99c**.

17" CONVERSION KIT $24.95

The new 17HP4 blackface picture tube operates from 8 to 14KV high voltage. It is the conventional 17" rectangular 4 speed 70° yoke and single ion trap are required. Focusing is accomplished by electrostatic means, applying from 300 volts or less to the focus anode, pin No. 6. All other connections and characteristics are similar to a 17BP4. No focus coil or focus magnet is needed. You get the 17HP4 tube, a 17" rectangular plastic safety mask with gold trim, plus tube characteristics, all for ..... **$24.95**. Stock No. HPM-17, shipping weight 30 lbs.

17J1-X, Universal Flyback with connecting instructions. **$3.95**. 70° Deflection Yoke. **$2.95**. Width Coil, **99c**. 5 meg. Focus control, **99c**.

LOOK AT McGEE'S 10-TUBE ALL-PURPOSE RADIO KIT—ONLY $29.95

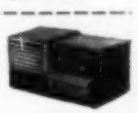
10-WATT HIGH FIDELITY AMPLIFIER KIT $14.95



★ MIKE INPUT ★ PHONO INPUT
★ BASS AND TREBLE BOOSTER

A complete kit of parts, including tubes, diagram and instructions, to build a 10 watt high fidelity twin tone control audio amplifier, bass and treble boost. Inputs for radio tuner, crystal mike and crystal phono pickup. Output transformer matches 8 ohms. Use with our 12" coaxial PM speaker, or any good PM and have a beautiful sounding, jet low cost amplifier. Response from 30 to 15,000 cps. Chassis is ready punched and a ventilated cover is furnished. A straight forward circuit with twin triode gain stages and 2-5U4G tubes in push pull. New twin 150 ma. selenium rectifier voltage doubler; television type power supply. Price includes tubes: 12AX7, 12AU7 and 6.5U4G. A good 25 watt kit with matched parts. Size, 5¼"x10"x5⅝" high, including cover. Stock No. AP-10U, shipping weight 8 lbs. Sale price **$14.95** each. 12" coaxial PM speaker, **$12.95**, extra.

MODEL ME6-2 $14.95



NEW MODEL 6-TUBE, 2-BAND RADIO KIT
A FULL 2-GANG SUPERHET KIT
RECEIVES 550-1600 KC PLUS 6-18 M.C.

McGee's new 1951, 6 tube, AC-DC 2 band radio kit. Receives broadcast, 550 to 1600 kc and short wave, 6 to 18 mc. A straight forward superhet circuit with 2 gang tuning condenser, 456 kc I.F. transformers, etc. 5" speaker illuminated slide rule dial. Everything furnished, including tubes, 12SK7, R.F., 12SK8 mixer, 12SK7 I.F., 12SQ7 detector, 1st audio, 35L6 output, 35Z5 rectifier, diagram and a photo showing view of underside of chassis. The chassis ears and dial parts are factory production. With this kit, you can build a commercial looking and factory quality 2 band radio, housed in a streamlined plastic cabinet. Size: 13 x 6⅝ x 6⅝". Stock No. ME6-2, shipping weight 10 lbs. Net **$14.95**.

SELF POWERED AC Broadcast Tuner Kit, 3-Gang Tuning. Complete Kit, $12.95



A self-powered, 3-gang superhet tuner kit with R.F. stage. When wired according to our diagram will make a top quality broadcast tuner (550 to 1650 kc) for use with any amplifier. Don't close this with ordinary tuners, this has its own power transformer. This complete kit is furnished with a diagram, photos and tubes, 6AU6 R.F., 6BE6 oscillator R.F., 6AU6 I.F. detector, 6AL5 diode, AVC, plus rectifier transformer to any audio amplifier. Ideal for use with our 8-20-30, TM-16 or TX5 amplifier kits. Shipping weight 9½ lbs. 6½" high. Shipping weight, 7 lbs. Broadcast Tuner kit Model BT-3BX. Net price, **$12.95**.

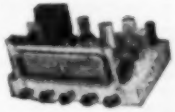
8-TUBE 22 WATT Wide Range Amp. Model Tx5 Kit Only $37.95



A complete kit, including tubes 2-7S7, 2-7F7, 2-6A3, plus rectifier, diagram and photos. All triode circuit makes for minimum harmonic distortion. Inputs for radio tuner and any kind of phono pickup crystal or G.E. variable reluctance and either crystal or dynamic mike. Output transformer matches 8 ohm voice coil. Twin electronic tone controls, bass and treble with range selector switch for either juke box quality with heavy bass response or brilliant symphonic range. The best quality amplifier kit we have made. It has very wide range output and heavy power transformer. Response 18 to 20,000 CPS. 8 tube all triode amplifier kit, complete with tubes. Weight 25 lbs. Net **$37.95**.

10-TUBE RADIO KIT $29.95

3-GANG TUNING
MIKE INPUT
12 WATT
HI-FI AUDIO
BASS-TREBLE BOOST



A NEW 1952 ALL-PURPOSE RADIO KIT
ALL-PLATED CHASSIS PARTS

10-Tube Broadcast (550 to 1700 kc) Radio Kit for custom builders. Features 3-gang superhet circuit with A.V.C., high gain IF circuit, 6" slide rule dial, measures over 12½" long, 10" deep, 6½" high. Audio inputs for a crystal or dynamic mike, and record changer or player. Tone compensation for standard crystal pick-up or General Electric variable reluctance. Push-pull 6V6 output tubes, shielded high fidelity output transformer matches 8 ohm PM speaker, husky power transformer, 2 tone controls for separate bass and treble boost. A complete kit, including tubes 6SK7 R.F., 6SA7 mixer, 6SK7 I.F., 6S6 detector, AVC, 6SQ7 1st audio, 12AX7 variable reluctance and mike amplifier, 12AX7 phase inverter, 2-6V6 outputs, pwr rectifier, diagram and instructions. Shipping weight 18 lbs. Stock No. BK-R10. Net price **$29.95**. 10" PM speaker, **$4.95** extra. Crystal mike and desk stand, **$4.00** extra. 12" coaxial speaker **$12.00** extra.

5-Tube Broadcast SUPERHET RADIO KIT $12.95



Model RS-5 tube AC-DC superheterodyne radio kit. Has loop antenna and 2 gang condenser, with lighted slide rule dial and attractive plastic cabinet. Receives broadcast, 550 to 1650 kc. Full size diagram speaker, matched 456 I.F.'s, automatic volume control. This is a complete radio kit. Everything furnished, including diagram, photos and tubes: 12K8 mixer, 12SK7 I.F., 12SQ7 detector, 1st audio, 50L6 output, 35Z5 rectifier. Shipping weight 7 lbs. Stock No. RS-5. Net price **$12.95**.

Build Your Own Phono-Mike Broadcaster $7.95



Kit Model DE-6B. With this simple kit, you can build a 3-tube phono operated broadcaster, with a mike input. Will broadcast over any radio within your home, about 75 feet from 1000 to 1500 kc. Inputs for crystal mike or crystal phono pickup. Faster control takes from mike to record. Ideal for a home P.A. system, radio intercom and home entertainment. A complete kit of parts including tubes. Kit Model DE-6B. Net price, **$7.95**. DE-6BWT, wired and tested. Net price, **$9.95**. Crystal mike and desk stand, **$4.00** extra. Concealed microphone unit, only 1" in diameter and ½" thick, specify hidden mike when ordering. Stock No. T-0031. Net, **$3.95** extra.

3-WAY PORTABLE KIT $15.95



A NEW '52 MODEL

New 1952 Model 3-way portable kit. Complete kit, less cabinet. Operates on 110 Volts AC or 6 volts DC, plus 117 volt self contained battery. Leatherette covered case size, 9½x8½x5". Receives broadcast 550 to 1650 kc. A conventional 2-gang superhet circuit with 456 kc I.F.'s. Uses 12K8 mixer, 12SK7 I.F., 12SQ7 detector, AVC, 1st audio, 50L6 output, 35Z5 rectifier. Has built-in 5" PM speaker. A factory quality kit. Stock No. PN-4T, shipping weight 15 lbs. The complete kit, less batteries **$15.95**. 6 volt vibrator, **$1.89**. 117 V. A, **39c** extra.

McGEE RADIO COMPANY

Prices F.O.B. K.C. Subject to change without notice. Order Balance Sent C.O.D. With Parcel Post Orders, Include Postage

TELEPHONE VICTOR 9045. WRITE FOR FLYER
1422 GRAND AVE., KANSAS CITY, MISSOURI

TV RECEPTION UP TO 200 MILES

ON ACTUAL FIELD TESTS WITH

NEW DX630 CHASSIS

USING THE CASCODE TUNER

will operate in fringe areas or in localities remote from TV broadcast stations up to 200 miles.

HAS 4 MICROVOLT SENSITIVITY—10 times any other TV receiver. Will pick up distant stations without use of booster or special antenna arrays—and with less noise. Will operate any tube including 24", greater brilliance, improved keyed AGC circuit (eliminating flickering and fading). Uses the best materials with a high factor of safety to insure trouble-free operation. STD RTMA GUARANTEE free replacement of defective parts or tubes for 90 days. Completely factory-wired chassis ready to operate with 12" P.M. Speaker. Price including Excise tax $144.50

TELEVISION PICTURE TUBES
Standard Brands

ONE-YEAR GUARANTEE

12½" (Black or White)	$22.50	Glass 16" Round (Black)	$28.50
Glass 14" Rectangular (Blk.)	$23.50	Glass 16" Rectangular (Blk.)	$27.25
17" Rectangular (Blk.)			$25.95
19" Round (Blk.)			$39.95
20" Rectangular (Blk.)			$38.35
21" Rectangular (Blk.)			$42.95
24" Metal			$67.75

Consoletta cabinet of beautiful design made of the finest veneers and good finish. Size 39" high x 24" wide x 22½" deep. Finished in mahogany or walnut. Cut for 630 chassis with 12" speaker; will take either 16, 17, or 20" tube. (Please Specify Size.)

Price including mask and excise tax $43.95

Extra for glass $2.75

For the various other cabinets in our large selection we will furnish photos and other NECESSARY INFORMATION, ON REQUEST.

TELEVISION COMPONENT SPECIALS

"Faster Than Hotcakes!"

That's how these original 13-channel RCA Tuners are selling. Uses 3—6J6 tubes. Sold as is, less tubes, only $3.95

NEW STANDARD COIL CASCODE TUNER

The tuner that will give you stronger, better and clearer reception. Uses 1—6J6 and 1—6BK7 Intercarrier $19.95

New—DuMont Tru Focus Conversion Kit

Convert your old set for even focus over entire screen.

DuMont 70° Yoke, Model Y2A1—distributed winding	$6.57
DuMont 70° Flyback Transformer Model H1A1	$6.57
DuMont Linearity Control—for above units	$0.75
DuMont Width Coil—for above units	$0.75

AUTOMOBILE RADIOS

Custom-Built for any of the following 1949-1950-1951-1952 automobiles—Dodge, Plymouth, Chevrolet, Hudson, Studebaker, Henry J. and Ford. Every Radio is a powerfully built, 6 tube superhet with R.F. Stage and 3 gang condenser. Each radio is Custom Built and can be mounted in the dashboard within 4 minutes. Your price including aerial $38.47 ea.

All Merchandise Subject to Prior Sale. All Prices Subject to change without Notice.

WRITE FOR COMPLETE CATALOG N-4

EDLIE ELECTRONICS INC.

154 Greenwich St. New York 6, New York

Magnetic Tape and CBC

(*Continued from page* 38)

particularly heavy at Winnipeg as time-zone delayed-scheduling is handled at that point for broadcast material which feeds from both west to east and east to west.

In 1950, three additional channels were added to this installation and about 350 hours of recording and reproducing are handled by this equipment during each four week period on the air.

By using magnetic tape, *CBC* will save approximately $100,000 in the fiscal year 1951-52 in recording materials (i.e., the cost of discs which would have had to be used if tape were not available). However, this must be weighed with the fact that the conversion to magnetic tape has led to a considerable increase in the recording load.

For an average month, approximately 900 hours of tape recorded material is used on the air by the *CBC*. Thirty million feet of tape per year runs through the *CBC* tape recording and playback machines. Tape is used at *CBC* for: (a) News event recording; (b) Delayed broadcast recording; (c) Auditions; (d) Air checks; (e) Reference recording; (f) In certain locations, where the station is mainly a network outlet, tape has been installed at both studio and transmitter. Evening operations originate from tape or at the network transmitter. Station calls, announcements, and programs are taped ahead of time; (g) Shortwave receiving stations use tape for off-the-air recording, monitoring, etc. Considerable *BBC* material, such as news and commentaries, is obtained in this manner.

The latest *CBC* studio installation is the *CBC* Radio Canada Building in Montreal. The master control for this location is set up to accept 26 inputs and can feed these to 14 output lines. A total of 28 studios are housed on the first 2 floors of this building. The recording room, when completed, will comprise 10 disc and 10 tape channels with space for expansion.

Remote-control facilities for the tape recorders and playbacks are available in all studio-control rooms and transmitter-booths.

Headquarters for the International Service and the French Network together with the National Engineering Headquarters Department and various executive offices are located on the remaining ten floors of the same building in Montreal.

The Engineering Headquarters comprises the office of the Director General of Engineering, the Plant, Architectural, Transmissions and Development, Operations and Engineering Projects, and Services Departments of the network.

CBC has proved to its own satisfaction that magnetic tape pays off handsomely in improved operations and reduced maintenance costs. —30—



THE possibility of pre-recorded magnetic tape eventually replacing the disc in broadcast, industrial, wired music, educational, and home entertainment applications has been a subject for wide discussion among professionals and audio enthusiasts for the past two or three years. The proponents of the "disc" have continued their research and development during the past few years. They show no signs of slowing down their efforts to make discs better and better. In its present stage of development, the long playing Microgroove disc represents a formidable obstacle to the *rapid* development of a broad market for pre-recorded tape. It is an accepted fact that as a basic medium for master recording, magnetic tape is in a class by itself. Without it, the rapid growth of the long playing disc would never have been possible. Time and time again, the question has arisen: Why not bypass the expensive and complex disc process entirely and make direct tape duplicate recordings available on a mass production basis? This is a legitimate question, an important one, too. But the steps toward its solution are not easy.

Perhaps one of the basic difficulties in advancing pre-recorded magnetic tape is the sale price, necessitated primarily by the high cost of magnetic tape stock (relative to the cost of materials used in a record pressing). However, this is somewhat a case of the "chicken and the egg" in the basics of economics: supply-demand-mass production-sales price. Perhaps when the demand has been created or when it comes about naturally and mass production can be reached, the cost of magnetic tape stock purchased in huge quantities will cause the basic stock costs to plummet downward, enabling a reflected drastic reduction in the retail price of pre-recorded magnetic tapes. This would cause a new cycle of increased demand, increased production and, perhaps, the wider adoption of pre-recorded magnetic tape libraries.

Another factor which has to be overcome by the proponents of "tape" is the issue of the relative *difficulty* in handling magnetic tape. It is claimed by some that the simplest tape machine is a more difficult mechanism to operate than is a three-speed automatic record changer. Here we find that people differ widely in this matter. Perhaps the opinions frequently vary because of confusions in the points which are sometimes considered to add weight to the "anti-tape" attitudes. We must talk about things on the same levels. If we refer to tape recorders, we must refer to disc recorders. If we refer to

tape players, we must refer to disc players; not a "tape recorder-playback" *versus* a "record changer." Examine the respective equipment in that correct light and come to your own conclusions as to the "difficulties" of handling.

* * *

Tapes of the Month

A-V #101 (MUSICAL VARIETIES)

Wait and See—I Didn't Know What Time It Was—You Are Too Beautiful—It's A Big Wide Wonderful World—Linda Mujer—Crinoline Days—Laura—I Love You So Much It Hurts Me—Sleepy Lagoon—Jungle Lament.

(Available in 7.5" single-track; 7.5" double-track; or 3.75" double-track)

A-V #304 (MOMENTS IN MUSIC)

The Gondoliers, Patience, and Iolanthe (Gilbert & Sullivan)

(Available in 7.5" single-track; 7.5" double-track; or 3.75" double-track)

A-V #303 (MOMENTS IN MUSIC)

Come To Me, Bend To Me—Every Day—Song of India—I'll Remember April—More Than You Know—Intermezzo from L'Arlesienne Suite (Bizet)—Minuet in G—Minute Waltz (Chopin)—Gopak (Mussorgsky).

(Available in 7.5" single-track; 7.5" double-track; or 3.75" double-track)

According to the company's catalogue description of Reel #101: "Select ensembles play the music that has become a part of the American dancing and singing scene; truly classically popular melodies. This series is very much a favorite in the tape library."

According to the same catalogue, Reels #303 and #304 are "a charming potpourri of music for listening or reading; salon and symphonic groups. These program-reels form an excellent background for friendly conversation."

The artists who performed on these reels are not identified in the *A-V Tape Libraries'* catalogue and are probably a "pickup" group which regularly plays for some well-known publisher or conductor and who augment their incomes by "free lancing" such jobs. The performances are charming, the type of music one is used to hearing over the wired music systems. Tonal reproduction is adequate—not impressive, just adequate. The Gilbert and Sullivan excerpts contain no vocals, as is presently customary on all *A-V* reels. One might have some fun with this reel if one obtains the libretto to follow along with the tape.

A-V #1001 (CONCERT HALL)

Faust Ballet Excerpts (Gounod)
Nutcracker Suite Excerpts (Tchaikowsky) including Overture Miniature, Marche, Danse Arabe, Danse De Mirlitons

(Available in 7.5" single-track; 7.5" double-track; or 3.75" double-track)

This reel was the first "Concert Hall" release in *A-V's* catalogue. Here again, no artists are listed and the brief catalogue description bills it as a "professional performance perfectly recorded." The performance is mediocre stuff, something that one *has* to have in a catalogue from the standpoint of music titles.

SALE! WHOLESALE ONLY SALE!

HEADSETS
HS 10—BRAND NEW $1.75
HS 33—BRAD NEW 3.50
ARMY HEADPHONE with cord, rubber cushion and headband, low impedance. Perfect for pillow speaker, sound power phones—BRAND NEW ..... .50

MICROPHONES
THROAT MIKE—NEW ..... $ .50
LIP MIKE—NEW 1.00

LOOPS—ANTENNAS
LP 21—NEVER USED $9.50
AN 104A—NEW 1.25
MN 26C—BRAND NEW 4.50
AS 61/ARN-5—COMPLETE AND NEW 1.00
AS 62/APS-13 ANTENNA SYSTEM with all parts—NEW 2.50
CORNER RADAR REFLECTOR—NEW 5.00
WHIP ANTENNA 37-56MC—6 ft. long with CD-AX Cable 1.50

HANDSETS
Handset TS-9 ..... $3.50
Handset Receiver Units ..... .65
Handset Transmitter Units ..... .65
Receiver Caps for Handsets ..... .20
Handset Hanger ..... .35
Headset HS 38 ..... 1.50

TELEPHONE EQUIPMENT
RM-12D Telephone with Handset $25.00
RM-29 Telephone with Handset 20.00
SWITCHBOARDS BD-72 ..... 40.00
EES Field Telephones 17.50
Telephone Ringers MC 131 ..... .75
Coils C111 ..... .65
Coils C158 ..... .30

LINK TRAINERS C3
Complete with ILS and ADF $1750.00 ea

HORIZONTAL BOMBING AND DEAD RECKONING TYPE A5
Complete with bombsight $3000.00



PLUGS • CONNECTORS
CLAMPS • AMPHENOLS
CANNONS • MELAMINE
80% OFF



WE HAVE ALL TYPES WITH CORDS AND CABLES, OR WITHOUT



WE HAVE SERIES OF:
3100 3104
3102 3108



WE HAVE SERIES OF PL, UG, SO
WE HAVE SERIES OF 3057



WE HAVE OVER 1 MILLION IN STOCK
in over 3000 TYPES!!
Get Our Low, Low Prices . . . WIRE, WRITE, PHONE!!

MISCELLANEOUS
RELAY RW 172 ..... $4.50
RELAY 116C, 115 VAC, Type 950—NEW 1.00
COLLINS AUTOTUNES — Type 511/125 for ARC-1—NEW 9.50
COMMANDO POLE JACKS (COOK) #523-53 with JK 47 with cover—NEW ..... .75
COIL C111—NEW ..... .60
HOUR COUNTERS, 1/10 HR. Counts up to 999.0 HRS—NEW ..... .75
BC-347 C ..... $2.50 BF Coils ..... .75
BC-450 A ..... 1.25 FT 234 A MC 1.00
BC-451 A ..... 1.50 RL 42 ..... 2.50
Matching Transformer C410 with plug ..... .90
Code Wheel Sets RX47 ..... .25

CORDS AND PLUGS
CD 78—NEW ..... $ .15
CD 307 with PL 55 and JK 26—BRAND NEW ..... .75
CD 365 with PL 108 at each end 1.00
CD 318 with PL 68 and JK 48 and switch—BRAND NEW ..... .40
PL 68 on Cord CD 318—NEW ..... .40
PL 55—NEW ..... .40
PL 55 ENGLISH RED BARREL—NEW ..... .20
CD 365 with 2 plugs PL 108—NEW 1.25
MC 215 Cables 2.00
MC 124 Cables 2.50
PL 068 Cord ..... $1.50 PL 126 ..... $1.00
PL 112 Plug ..... 1.00 MC 211 ..... .50
PL 118 Plug ..... 1.00 M 359 ..... .25
PL 122 Plug ..... 1.50 CD 301 ..... 1.50
PL 108 Plug ..... .90 CD 604 ..... .75

BALLOONS
Inflate to 2 ft. $1.00 Inflate to 4 ft. $2.00
Inflate to 3 ft. 1.50 Inflate to 6 ft. 3.00

KITES—ARMY—LARGE TYPE $2.50

SWITCHES
W 2 CRTC ..... $ .25
B9A ..... .25
R7A ..... .25
BC 785 SWITCHBOX ..... .75
Jack JK 26 for PL 68 ..... .15
BC 496A 1.50
RM 13 G in chest CH 54H—complete with handset, cable, plugs, etc. 35.00

TRANSMITTERS AND RECEIVERS
RECEIVER CAA Approved—RC-ARN-7 ..... $ 275.00
RECEIVER ADF—BC 453—used 25.00
ARC-1 TRANSCEIVER—checked out 10 Channel 950.00
ARC-1 TRANSCEIVER—checked out 20 Channel 1,150.00
S.O.S. TRANSMITTER—complete with tubes, Generator, Lamp, 300 ft. antenna copper wire, Crank, Parachute—BRAND NEW 5.50
MATCHING NEDOR KIT for SCR 270—complete with Plugs, Connectors, Tubing, Cables, Screws, Washers, etc.—NEW 7.50
CU 24/APS-13 MATCHING SECTION, connects transmission line and Rec'vr lines, 2 plugs and T connector—NEW 1.75
CONTROL BOX—BC 434—NEW 3.50
CONTROL BOX—C4/ARN-7—NEW 25.00
SHIP-TO-SHORE TBX TRANSCEIVER—NEW 35.00
T 26/APT-2 TRANSMITTER—NEW 35.00
CRT-3 DUAL CHANNEL GIBSON GIRL—Complete 60.00
BC 929 Indicator P/O APN 2 ..... 20.00
Control Box C 87/ART-13 ..... 6.50
Control Box BC 732 ..... 1.50

MOTORS
G.E. 5 AM 31 NJ 18A, Input 27 V, 44 A, 8300 RPM, Output 60 VDC at 8.8 A, 530 watts, NEW ..... $ 7.50
DE 108—New $45.00 MC 140—used 25.00
D 311—New 3.50 GE 5 BA 50 D 311—New 3.50 LZ 29—New 7.50
BM 33—used 1.50 PW 1 to 4 GN 37—500 APT-5 Pole at 50 A 7.50
amp—New 7.50 PE 94 ..... 4.50
PE 98—used 25.00 PE 73 ..... 9.50

TEST SETS AND SPARES
TS 10—New $20.00 TS 34—New $100.00
TS 16—New 20.00 EE 65—New 25.00
BC 1203 Pulse Test Set for SCR 535—used 95.00

TALLEN CO., INC. 189 CARLTON AVE., BROOKLYN 5, N. Y.
PHONE: TRIANGLE 5-8241

SALE! SALE!

CLOSE-OUT—12" CO-AXIAL SPEAKERS

★ THOUSANDS HAVE BEEN SOLD FOR $13.95
★ WE MUST MAKE ROOM FOR THE NEW MODEL!



$10.95 WHILE THEY LAST

Stock No. S-160

Our regular $32.50 retail hi-fi speaker, 20 watts. We are closing out this speaker. We want to make room for the new model which will be coming in soon. Order one or more of these fine PM speakers during this sale and save money. This is the same type of speaker you will find in $500.00 combination radios. Each speaker consists of a 12" woofer section driven by a heavy Alnico 5 magnet and this part delivers the bass notes. The 3" tweeter speaker is built into the center of the speaker and is driven by a 2.15 oz. Alnico 5 magnet. This part delivers the treble notes. The high pass filter is built into the speaker and the entire combination gives you tones you never dreamed possible. Only two wires to connect to any radio or amplifier and the speaker is ready to play. Voice coil impedance is 8 ohms. Shpg. wt. 10 lbs.

★ 12", Wide Range Co-Axial Speaker
★ 40 to 17,500 CPS Response
★ Don't Delay! Order Now!

PHONO AMPLIFIER

STOCK NO. RA-19



$3.98 LESS TUBES

A real high efficiency 3-tube amplifier of modern design. Connect to any crystal phono arm and speaker. Has volume and tone controls 7"x3½"x2". Shpg. wt. 2 lbs.

SET OF TUBES FOR AMPLIFIER (2SQ7, 50L6, 35Z5, No. AS-22 $2.64

MOTOR and ARM



A BIG VALUE

$3.99 STOCK NO. RA-91

COMBINATION OFFER — You get an Alliance Rim Drive 78 RPM Phono Motor with turntable PLUS a Pick-up Arm with high Output Cartridge. Shpg. wt. 6 lbs.

CRYSTAL MIKES



$5.95 EACH

STOCK NO. M-67

Astatic high output crystal mike for PA systems and recorders. Equipped with handle base and 7' shielded cable. Shpg. wt. 5 lbs.

M-67, each $5.95

M-66, same but with on-off switch built into handle $6.95

VM 2 SPEED AUTOMATIC RECORD CHANGER



$19.99 EACH Stock No. RA-99

★ Changes All 33⅓ and 78 RPM Discs
★ Intermixes 10" and 12" Discs
★ Stops After Last Record
★ Jam Proof ★ Hi-Fi Turn-Over Cartridge
★ 100% Guaranteed

Built for RCA. Factory sealed cartons. Worth $45.00 List.

Now you can take advantage of this deal that Olson ran across. Incorporates the latest design to play the records in most demand, 33⅓ and 78. Records may even be intermixed on the spindle. Will hold twelve 10" or ten 12" discs in one loading. Records slide down the center shaft with utmost precision. Low pressure tone arm equipped with an RCA turn-over cartridge and two permanent needles. Shuts off after last record. Has reject button also. Size 12" x 13". Operates on 115 volts AC, 60 cycles. Shpg. wt. 15 lbs.

NO MORE WHEN THESE ARE GONE. SEND FOR YOURS NOW!

BUILD YOUR OWN RECORD PLAYER



$8.95 STOCK NO. AS-52

SINGLE SPEED MODEL

This fine kit contains a 78 RPM rim drive motor with velvet finish turntable, crystal pickup arm, all purpose needle, 4" PM speaker, matching output transformer, 2 tube AC-DC amplifier and a set of tubes (35W4 and 50B5). Shpg. wt. 8 lbs. Stock No. AS-52 $8.95

3-SPEED MODEL

Similar to above except kit is equipped with a 3 speed phono motor and turntable to play all 33⅓, 45 and 78 RPM discs. Shpg. wt. 8 lbs. Stock No. AS-53 $11.95

2 STATION INTERCOM



$19.83 Stock No. RA-96

Now talk with anyone, anywhere at the mere flick of a button! All electric master station and substation give clear, powerful voice reproduction to rooms or other buildings up to 1000 ft. away. Thousands have been sold for use in restaurants, on farms, in offices, stockrooms, factories and in homes. Just plug master station into any 115 V AC electrical outlet—connect 3 wires and you're operating. Modern design. Each unit measures 4½ x 4½ x 5½". Equipped with rubber feet and easy slide switches. Handsome appearance—gray crackle finish. High amplification—use 3 tubes. Power output 2½ watts. Regular list price is $37.50. You get the master station, substation and 50 ft. of 3 conductor cable. Complete with tubes. Shpg. wt. 8 lbs.

12" PM SPEAKER

Stock No. S-167



$3.95 Ea. Single, Each lots of 3 $4.95

A full size 12" PM speaker worth much more, is now available at a good deal and you can cash in. Unit is designed to bring out full rounded tones. You can use this 8 ohm 12" speaker in three for speakers if you act fast. In all our history we never had a speaker with such fine features at a price to compare with this. Voice coil impedance 8 ohms. Shpg. wt. 6 lbs.

3 SPEED AUTOMATIC CHANGER



COMPLETE with VM Model 950 Changer, Amplifier, Speaker and Case. A real Olson value if we ever saw one! Here is the latest VM Model 950 Automatic Changer built into a beautiful carrying case with speaker and amplifier. Plays twelve 7" records (45's) or 10" records (33⅓ or 45 RPM) or ten 12" (33⅓ or 78 RPM). Automatic or manual operation. Nothing more to buy when you order this fine player from Olson. The cartridge is equipped with a long life needle. Motor shuts off after last record. Equipped with volume control and tone control. Speaker is Alnico V PM. Carrying case is beautifully covered. Size 15"x13"x8½". For 115 volts 60 cy. AC. Regular list price $77.95.

$42.95 Stock No. RA-70

USE ORDER BLANK ON NEXT PAGE →

OLSON RADIO WAREHOUSE • 275 E. Market St., Akron 8, Ohio

A-V # 1004 (CONCERT HALL)

Part 1. Overtures to Die Fledermaus, Gypsy Baron, and Waldmeister
Austrian Symphony Orchestra, Max Schoenherr and Felix Guenther, conductors

Part 2. Strauss Medley including Annen Polka, New Wein, Acceleration Waltz, Intermezzo, Tik Tak Polka
Austrian Symphony Orchestra

(Available in 7.5" single-track; 7.5" double-track or 3.75" double-track)

This reel of Johann Strauss music has a good deal to offer, for the music is played with the authentic Viennese *lilt* and *brio*. The timing of the selections is not given. This may become a necessity when broadcasters adopt pre-recorded magnetic tapes for direct broadcast and programming.

(Each package should be fully labeled with copy taken from the *A-V* catalogue—Editor)

—30—

What's New in Radio

(Continued from page 77)

age of the directly-connected filaments of the cathode-ray tube are fed through the transformer and boosted. This additional voltage is sufficient to give weak tubes their original emission characteristics and restore normal



brightness. The reactivating voltage is low enough to preclude any damage to the filament.

Distribution of this new unit is through regular jobbers but additional details may be obtained from the company.

SCOPE PROBE

Scala Radio Co., 2814 19th Street, San Francisco 10, California is announcing three new oscilloscope probes for TV servicing applications.

Designed to be used with any oscilloscope, these new units come complete with coaxial leads and complete operating instructions. The signal tracing probe (B.Z.1) can be used to locate dead i.f. stages, mark ratio detector curves, calibrate a marker generator, adjust video amplifiers, check the output of a sweep generator, view the response of a single i.f. stage, etc. This unit is useful up to 225 mc.

The second probe is a low capacity unit, the B.Z.2, which makes possible the tracing of video, sync, or sweep waveforms through high impedance

MAKE UP YOUR ORDER IMMEDIATELY AND MAIL TODAY!

PLASTIC BASE RECORDING TAPE



Get the buy of your life. Save up to 64% on high quality RECORDING TAPE. A large manufacturer had to sell his inventory and he unloaded the whole deal. Olson now offers you this high grade recording tape at prices which defy competition. Standard ¼" wide, 1200 ft. long. Frequency response 50 to 8,000 cy. Plastic Reel included with each.

600 Ft. Reel	1200 Ft. Reel
Stock No. K-375	Stock No. K-340
Single, ea. $1.49. LOTS OF 10, EA. $1.29	Single, ea. $2.19. LOTS OF 10, EA. $1.99

PRICES SLASHED ON EMPTY PLASTIC REELS
Finest Clear Plastic—Will Not Warp

5" Diameter—600' Size. No. K-250. Single, ea. 30c. LOTS OF TEN, EA. ..... **29¢**

7" Diameter—1200' Size. No. K-251. Single, ea. 49c. LOTS OF TEN, EA. ..... **39¢**

STANDARD COIL TV BOOSTER

★ Latest Model ★ Brand New
★ Reg. List Price $30.00
★ While they last. Model No. B-55.

$10.95 Ea.



Just connect one of these Standard TV Boosters to your receiver and get brighter, snappier pictures and less "snow" and interference. Easy to attach. Works on all TV sets. An amazing deal—you can cash in—save money—Order Today. Tunes all 12 channels. Uses a 6AK5 tube and a selenium rectifier. Complete. Operates on 115 V. A.C. Shpg. wt. 6 lbs.

COMPLETE TV ANTENNA



Stock No. AU-23

$8.99 Complete Set

A complete stacked array. Made by a famous manufacturer whose name and brand is on every factory sealed carton. Look what you get: 2 six-element conical bays, 1 pair "Q" bars, 2 Five-foot mast sections, 60 ft. 300 ohm twin line, 5 Standoff insulators, 1 mounting base, 1 guy ring, 1 clamp, hardware. Elements are highest quality aluminum. Reg. list price is $31.95. Shpg. wt. 12 lbs. Express only.

OPEN WIRE TV LINE ★ Use in Place of 300 Ohm Line



Ideal for fringe area installations. Not affected by moisture or sun. Made of 218 copperweld wire with genuine polystyrene insulators spaced 6" apart. Tensile strength 400 lbs.

Stock No. W-78.	Stock No. W-79.
100 ft. coil.	250 ft. coil.
Shpg. wt. 4 lbs.	Shpg. wt. 9 lbs.
$5.95	**$14.50**

TWIN LINE—300 Ohm Poly Twinline



High quality, low loss. For all TV and FM installations.
Shpg. wt. 2 lbs.
Stock No. W-73. 100 ft. coil. **$1.99**
LOTS OF 10, EA. **$1.99**
Single, ea. **$2.99**

SPECIAL

1000 Ft. Spool Twinline
Stock No. W-99. ..... **$12.95**



GIANT CONDENSER KIT — 69 PIECES — 4-DRAWER CHEST

FREE

OF EXTRA COST

Olson's Price AS-30 **$16.95**

You get $51.60 list worth of "Akrad" Condensers, plus the 4 drawer steel cabinet FREE, size 10"h 11¾"x10". Shpg. wt. 17 lbs.

42 "AKRAD" By-Pass Condensers

Qty.	Cap.	Volts	List ea.	Total
2	.001	600	$.25	$.50
2	.002	600	.25	.50
2	.005	600	.25	.50
5	.01	600	.30	1.50
5	.02	600	.30	1.50
10	.05	600	.40	4.00
10	.1	600	.45	4.50
2	.005	1600	.55	1.10
2	.008	1600	.55	1.10
2	.01	1600	.60	1.20

Aha 27 "AKRAD" Electrolytic Condensers

Qty.	Cap.	Volts	List ea.	Total
2	10	25	$1.00	$2.00
2	25	25	1.00	2.00
5	20	150	1.20	6.00
5	40	150	1.35	6.75
4	20-20	150	1.65	6.60
5	8	450	1.25	6.25
4	16	450	1.40	5.60
69 Value				$51.60

Stock No. RA-44

$18.95 Ea.



3-TUBE AMPLIFIER

Limited Quantity

While they last Olson offers these amplifiers which are ideal for window demonstrations, record playing, announcing, etc. Here's what you get: A three-tube amplifier with tubes, 6" PM speaker, and a two-tone leatherette covered case 5½"x8"x 10". Has input for either phonograph or crystal mike. Operates on 115 V, AC, 60 cy.

NOTICE—RADIO MANUFACTURERS

● Olson Radio has established a tremendous market among radio servicemen, amateurs, universities and industrials all over America as well as principal foreign countries. Our famous rapid mailing service is the talk of the trade.

If you have any good, clean surplus radio material which you wish to dispose of, contact Olson at once. We can use: radios, amplifiers, condensers, chassis, volume controls, pickup arms, test equipment, speakers, in fact any radio or electronic part or piece of equipment.

Here is your opportunity to turn idle inventory into cash. Write, wire or call Olson, the popular name in radio.

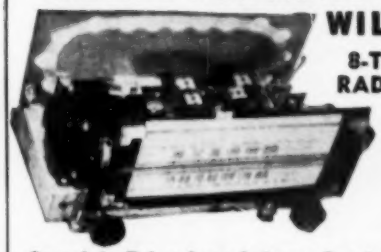
SEND FOR OLSON'S BRAND NEW BARGAIN CATALOG. GET NATIONALLY FAMOUS RADIO PARTS AND SUPPLIES AT BIG DISCOUNTS

CLEVELAND, OHIO
2020 Euclid Ave.
If you live in or near Cleveland visit our store, get these and many more bargains.

CHICAGO, ILLINOIS
623 W. Randolph Street
If you live in or near Chicago visit our store, get these and many more bargains.

MAIL ORDERS SHOULD BE SENT TO AKRON, OHIO

SPECIAL PURCHASE SCOOP!



WILCOX-GAY 8-TUBE AM-FM RADIO CHASSIS

$44.95 EA.

Stock No. RA-52

Complete: Tubes, Loop Antenna, Escutcheon, Knobs, etc.

Latest Model—Newest Features

This is not a kit or a tuner. It's a real high-powered AM-FM Radio Chassis that will pull in distant stations with amazing volume and brilliance of tone. Makes a perfect custom installation in existing cabinets, book-cases, walls, etc. Servicemen and Experimenters: Make money installing these for friends and customers.

The circuit is modern and employs 8 tubes (12AT7, 6BE6, 2-6BA6, 6AL5, 6AV6, 6V6 and 5Y3). The entire R. F. assembly and the 4-section tuning condenser in rubber mounted. Tuned R. F. stage plus two I. F. stages give this set terrific FM sensitivity. Separate FM oscillator tube for extreme stability, and triode R. F. and mixer circuits plus radio detector assure noise free, high fidelity FM reception.

Two modern dual knobs control on-off, volume and tone plus AM-FM, phone switch. Equipped with two panel lamps and edge lit dial. Phono input socket and AC receptacle at rear of chassis. Chassis size 13" wide, 7⅛" deep, 7¾" high. Cut out in cabinet requires 8x3⅛. Output impedance 8 ohms operates on 110-125v AC, 60 cycles. Shpg. wt. 20 lbs. In factory sealed cartons.

COMBINATION DEAL

You get the above Wilcox-Gay Chassis exactly as described PLUS a 12" CO-AXIAL Speaker (Stock No. S-160) PLUS a VM 2-Speed Changer (Stock No. RA-99) as shown in our ad on opposite page.

Deal No. AS-61 ..... **$74.95**

THIS COSTS YOU NOTHING—NOT A RED CENT



Just to get the ball rolling and to get your order coming our way—Olson is going to send you a handy all-rubber RADIO TUBE PULLER. Made of soft rubber. Easily pulls from stubborn sockets all regular glass tubes, metal tubes and 7 and 9 pin miniatures. Protects you from burns, shocks, and cuts. All you need do is to make up an order for $10.00 or more from Olson's ad—use handy order blank below. We will ship your order at once (Olson's quick service is famous from Coast to Coast) and include the RADIO TUBE PULLER—FREE.

IT'S EASY TO ORDER FROM OLSON'S

How to order: Order directly from this ad. For convenience use this order blank. Fill in columns below with quantity desired, stock number, description and price. You may send remittance with order (include enough for postage or parcel post shipment), or if you prefer SEND NO MONEY. Olson will ship C.O.D. and you may pay mail or express man for merchandise and postage.

MONEY BACK GUARANTEE: *Everything you order from Olson is guaranteed as advertised. If you are not more than satisfied, you may return merchandise for cash refund.*

Please Minimum Order $1.00

QUANTITY	STOCK NUMBER	DESCRIPTION	PRICE EACH	TOTAL

NAME _____ TOTAL

ADDRESS _____ ADD POSTAGE

CITY _____ ZONE ____ STATE ____ TOTAL AMOUNT

BN 652

OLSON RADIO WAREHOUSE • 275 E. Market St., Akron 8, Ohio

SUMMERTIME BUYS

STEAL AN AM-FM RECEIVER!

We promised not to mention the manufacturer's name on this, but it's one of the greatest. In 1951 they made more chassis than cabinets for their expensive console combination model so we got the chassis cheap. All tubes, 6V6 output, 10" high quality PM speaker, phono plug and switch, calibrated dial, and the manufacturer's exact shop wiring schematic, parts list, and alignment instructions included. Less cabinet and less escutcheon. This is a perfect setup for that inexpensive installation you've been dreaming of. Also, this FM section is the first we have ever seen that absolutely does not drift. These tuner positions in tuner assy. are phono. New and guaranteed.
ONLY $39.50

NOVICE 80 METER CW XMTR

Here's a neat and compact portable three which converts very simply to 2705-3750 KC crystal control. Completely Guaranteed suitable Instructions. Yes, we furnish them. Complete comprehensive step-by-step; nothing left to guesswork. This is S.S.T. the original transmitter which has been a favorite with oldtimers. By the time this ad appears, the new S.S.T. should be out. November QST. We got some of it worked out the conversion on S.S.T. It had to be corrected anyway, so why not convert the lower priced and available unit? Just as easy. Now if you can't wait these are all gone! ONLY $7.95

NOVICE 2 METER VOICE XMTR-RECEIVER

ARC-4 6 standard for two meter conversion. Excellent used, all tubes, complete, inverter.
Does ... $42.50
Less Dynamotor ... $11.50

80 METER RECEIVER

3-6 MC Command, with schematic, excellent sensitivity, but dirty worn. Satisfaction guaranteed $14.95

COMMAND EQUIPMENT

With free dope sheets and schematics
RECEIVERS
3-9 mc ... (see above) $14.95
BC-453, C-0 mc ... NEW $12.95 GOOD USED $7.95
TRANSMITTERS
T-19 ARC-5, 4 ... Excellent ... $17.95
BC-457 or T-20 ARC-5, 4.5 ... Like new ... $9.95
BC-458 or T-21 ARC-5, 5.3 mc Excellent used ... 7.95
MCR-SCR-458, 5.3 mc ... $5.95 ea. 2 for ... 9.95
As is, for parts ... 1.29
274N PLUG ... To get main plug to fit back of command units, and solder. This is the same plug as used in new packs. NEW, each 21c, five for ... $1.00
Local Control Adapter Parts For 274N or ARC-5. Exact set, switch, knobs, etched plate, and instruction data. Ready mount ... $1.29
SPLINE TUNING KNOB ... 79c

BUILD TV-FM-AM SWEEP GENERATOR

(See Dec. Radio & TV News)
Now you can build that "VERSATILE SWEEP FREQUENCY GENERATOR" We've managed to acquire just a few of the APN-1 magnetic units mentioned in the article. With original ... $6.95

4 USES—4 DOLLARS

The most versatile transmitter in surplus! The best transmitter for conversion to 6, 10 & 11 meters. Multiple windings for almost any power you want. Multiple windings for 6.3 volts at 50 MA or 250 volts at 100 MA. No brushes which mean no mechanical work. Or use it as a 2:1 or 1:2 stepup or step-down transformer for 60 cycle voltage! Changes 6 to 110, or 110 to 6, or vice versa, up to 3 A. Or use it as a GENERATOR. Turn with motor, get 12 v DC at 12.6 A or 24 v DC at 6.3 A. Or, with 6 volt battery, provides easily removable self-contained 800-1 sound for all your reduction work. Complete dope sheet furnished. BRAND NEW ... $4.00

SUPER HI-FI HEADSET BUY!

Uses acoustic grooved plastic fibre stereo with voice coils as in speakers, and padded channels ear muffs to obtain spacing for correct acoustical load. Gives finest sound reproduction, flat far beyond upper and lower limits of auditory perception. Pair in series has nominal impedance of 600 ohms at 1000 cycles, obtained with built-in high quality transformers. However, no noticeable change in sound between matched pair and superior to crystal phones. Manufacturer's net price is $45.00 per pair. Each unit can also be used as high quality dynamic mike with 600 ohm output impedance. They have to be checked out with freshly laundered heads to complete the sale. Our original New Old Pair sold out immediately, but we managed to locate some in Hawaii. Seems that's all that's left, so hot-foot to get your's! Get yours now ... $7.95

CHAMOIS HEADSET PADS. Clean, to cleanse, hygienic. They're a real pleasure to wear ... Pr. $2.00

BROADCAST BAND & AERO

MN-26-C Remote Controlled navigational direction finder and communications receiver. Manual DF in any one of three freq. bands, 150 to 1500 KC. 24 V. Self contained dynamotor supply. Complete installation, including receiver, control box, loop, azimuth control, Left Right Indicator, plugs, loop transmission line, and flex. shafts.
BRAND NEW, ORIG. PACK ... $69.50
MN-26-C alone, New ... $39.50
MN-26-E Loop, Brand new ... 6.95
MN-52 Crank drive, New ... 2.50

NEW CARBON MIKE

A little gem! Same impedance as T-17, but held in the palm of your hand. Nice flexible cord with standard 4 contact plug. Press-to-talk switch. New in original carton. BRAND NEW ... $2.79

PORTABLE POWER KITS

1. Includes 2 volt, 20 AH wet cell, lightweight transparent plastic, dirtite accumulators, 3 half cells, 4 1/8 x 3 x 4 1/16" high, shipped dry; also 2 volt automotive vibrator, no tube needed; also 2 volt charger, 115 v 50-60 cy input. This high quality unit uses step-down transformer and dry disc rectifier with pilot lamp to indicate on and reverse polarity protection. With instructions for battery filler and testing. ALL 4 ITEMS, BRAND NEW ... $4.95
2. Three 2 volt 20 AH wet cells and box (6-201) made for them. This box is a masterpiece of compact, lightweight construction, and includes insert wiring and vent lids. Set-up gives you six volts. Boxes may be edge-clasped together for multiple units.
ALL NEW $6.95
3. Six volt Vibrapack kit. Vibrator plus matching transformer with line cords, 115 v, 145 cy. Input, 135 v for plate. With schematic.
BRAND NEW $2.95

ANTENNA MAST SECTIONS. MS-49, 50, 51, 52, 53. New, original packing. Each 39c

G.I. ELECTRONICS

995 S. Vermont Ave., Los Angeles 6, Calif.
All Prices F.O.B. Los Angeles. Calif. Buyers Add Sales Tax
SEND FOR OUR CATALOGUE

circuits without causing waveform distortion due to circuit loading. It cuts the effective input capacitance of the scope by a factor of 10 and gives an attenuation of 10 to 1.

The B.Z.3 is a 100:1 voltage divider probe which is useful in troubleshooting horizontal sweep circuits. It may



be applied directly to the plate of a horizontal output tube or at the plate of the damper tube to check the operation waveforms and to measure their peak-to-peak voltages without impairing the waveshape or jeopardizing the oscilloscope.

NEW CONICAL ANTENNA

Kay-Townes Antenna Company, 1511 Dean Avenue, Rome, Georgia has recently introduced the Model C-2 conical type antenna which has been especially designed to provide maximum gain on Channels 2 through 13.

The antenna is constructed of $\frac{7}{16}$" aluminum tubing with double-plate dipole holders. Oak dowel pins are used in the construction and the mast clamps are of cast aluminum. This mast clamp assembly will take 1" to 1⅝" o.d. mast or pipe.

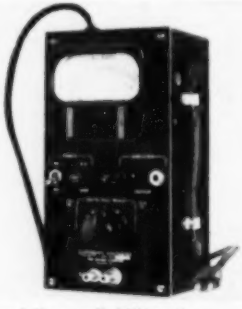
The high-frequency dipoles work in conjunction with the long dipoles for the highest possible gain on the high band. Both low band reflectors act as shields to the high band from the rear and add to the forward gain.

On the low band, the long receiving elements and reflectors offer a steady, strong signal. The low-band reflector is spaced a full quarter-wave and reflects the signal back to the receiving elements.

A data sheet on the Model C-2 is available without charge from the company.

ELECTRONIC VOLTMETER

The Daven Company, 191 Central Avenue, Newark 4, New Jersey has an-



nounced the availability of a new and improved electronic voltmeter, the Type 170-A.

This portable instrument is especially suitable for general laboratory and production use. The amplifier section and power supply section are separate sub-assemblies, a design feature which facilitates servicing. The amplifier is completely shock-mounted, reducing microphonic effects to a minimum. The amplifier and power supply are electrostatically and magnetically shielded from each other and from external fields.

The unit is designed to measure a.c. sinusoidal voltages over a frequency range from 10 to 250,000 cycles and a voltage range from .001 to 100 volts. Its accuracy is ±2% over the entire frequency range.

Complete detailed catalogue information is now available from the company.

LOW-COST TAPE PLAYER

Pentron Corporation, 221 E. Cullerton St., Chicago 16, Illinois is now marketing a new tape player which retails in the low price class.

Designed to play back magnetic recordings made on standard tape recorders at either 3¾ or 7½ inch-per-second speeds, the new unit is available either as a self-contained unit



with speaker and amplifier or with preamp only ready to plug into any existing amplifier, radio, or TV set. Both models feature double track operation and two speeds.

The company will supply full details on either or both of these models. The player with preamp only has been designated as the PB-1 while the complete player is the PB-A2.

WOW-METER

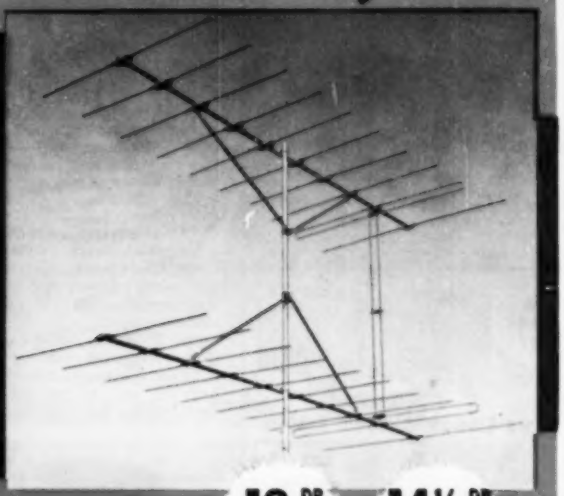
The Minnesota Electronics Corporation, 47 West Water Street, St. Paul 1, Minnesota is now marketing a wow-meter which measures both frequency variation and the center frequency of an audio signal direct.

The Type 152A is designed to measure wow in the center frequency range 800 to 1250 cycles while the built-in frequency meter is calibrated in the range from 600 to 1500 cycles. Other corresponding ranges may be obtained, on special order, to cover frequencies as high as 10,000 cycles with appropriately higher wow ranges.

Three wow spectra are available, ½ to 10; ⅓ to 120; and 10 to 120, with appropriate damping for each range and a meter reset switch for use on the

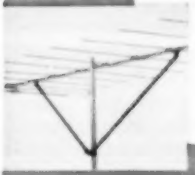
the BIG 10 is terrific!

CHANNEL MASTER'S fabulous new 10 ELEMENT YAGI

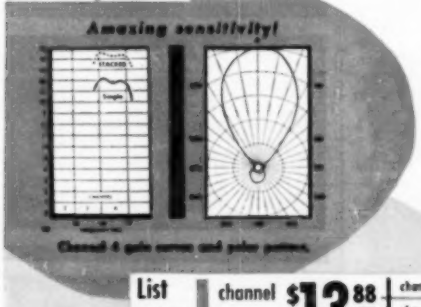


Highest Gains In TV History — **12 DB** single — **14½ DB** stacked

COMPARE these 10 Terrific Features:



BOOM BRACING
Another original Channel Master development. Eliminates crossboom "bounce" — provides steadier pictures.



Channel 4 gain curves and polar patterns.

1. 10 Elements—more signal, less noise, less rear pickup.
2. Highest gain of any Yagi ever developed.
3. Over 30% more gain than any 8 element Yagi.
4. This antenna **can be stacked,** with 78% additional gain over single bay.
5. Includes the famous Z-Match system.
6. You don't pay for stacking bars.
7. Excellent 300 ohm match in all installations.
8. "Boom Braced" to prevent crossboom "bounce" which causes picture flicker.*
9. Two piece "Swej-Lok" crossboom for simplified stocking, handling, and installation.*
10. Completely pre-assembled.

*Low Band only.

List Prices channel 7-13 **$13.88**

channel 2 or 3	$31.94
channel 4 or 5	28.47
channel 6	25.49

Write for name of your authorized distributor and complete technical literature.

MEMBER

CHANNEL MASTER CORP.
HAPANOCH ROAD, ELLENVILLE, N. Y.

Manufacturer's Closeout!

CENTRALAB BROWN DEVIL AND DIVID OHM WIRE WOUND FIXED AND VARIABLE RESISTORS MARKED GENERAL ELECTRIC

We've bought up a tremendous supply of these and now you can buy them below manufacturer's $4000 net prices.

10 WATT FIXED

1-1000	List $ .70	1-1000	List $1.47
1100- 5000	.40	1250- 5000	1.03
5000-10,000	.92	5000-10,000	1.62
10,000-25,000	1.08	10,000-25,000	1.80
25,500-25,000	1.08		
Your Cost. Each	.34		

20 WATT FIXED

5-1000 — List	$ .98
1200- 5000	.47
5000- 10,000	1.12
12,500- 20,000	1.30
20,000- 40,000	1.71
45,000- 60,000	1.98
50,000- 80,000	2.61
85,000-100,000	3.11
Your Cost. Each	.36

50 WATT ADV.

1-1000 — List	$2.37
1250- 5000	1.47
5000-10,000	2.69
12,000-20,000	3.85
20,000-40,000	5.08
50,000-60,000	5.30
80,000	5.97
100,000	7.05
Your Cost. Each	.86

100 WATT ADV.

1-1000 — List	$3.38
1500- 5000	1.87
5000- 10,000	3.07
12,500- 20,000	4.19
20,000- 40,000	5.30
50,000	6.93
100,000	8.08
Your Cost. Each	.79

Deduct 10%—Lots of 1000 or more. Deduct 20%—Lots of 10,000 to 10,000. Minimum Order—$2.00.

SPECIAL PURCHASE! Record Changer, Gen. Instrument 3-Speed Automatic

Reg. $34.95
Brand New
$10.97

With all-purpose cartridge and needle. Plays 33⅓-45 RPM records automatically.

NAVY VHF-CW Transmitter

Battery operated 471μV .8" and 1½V .4" Pro-quency 80 to 105 Mc Uses 9—1G4 Tubes—with in-struction manual—less tubes and batteries.

$4.95

HERE'S A REAL BUY



Two Station Intercom System

Less than half the original price. Built for America's leading dept. store chain, whose name we cannot mention because of this low price. Consists of master station, remote station and 20 ft. of 3 conductor wire. Can be used as a private or non-private system. 115V AC operated. Brand New. Now only $17.95. Additional wire, per ft., 3c.

BRAND NEW
now only
$17.95

VARIABLE CONDENSERS
From SCR-522
2-GANG 20 MMF
Per Section $1.29
3-GANG 25 MMF
Per Section $1.50

Brand New with Concentric Air Trimmers

LOW FREQ. XTALS-FT 241A
For SBB, lattice filter, etc. ½ spc. 5th or 7th harmonic channels listed by fundamentals. Fractions omitted.

374	405	436	505
375	406	437	507
377	407	438	508
379	408	441	509
380	409	443	511
381	411	444	514
383	412	445	515
384	413	447	516
385	414	448	518
386	415	450	519
387	416	451	520
388	418	452	522
390	419	453	525
391	420	454	526
392	422	495	530
393	423	496	531
394	424	497	533
395	425	498	537
396	426	563	538
397	427	504	
398	431		
401	433		
403	435		
404			

49c ea. 10 for **$4.80**

SCR-522 Xtals
¼" ins ½" spc.

5910	6363	7015
6370	6364	7016
6450	6366	7017
6460	6367	7018
6497	6370	7019
6522	6372	7020
6542	6374	7021
6610	6375	7022
7350	6376	7023
7480	6377	7024
7580	6379	7025
7810	6380	7026
7930		

99c ea. 10 for **$9.00**

$1.29 each

SPECIAL
200 4c stats without holders
69c each 3 for **$2.00**

DC-61 Xtals
2 banana plugs ¼" spc.

2030	2435	
2045	2442	
2105	2532	
2125	2545	
2145	2557	
2155	3202	
2220	3215	
2254	3237	
2280	3250	
2282	3322	
2290	3510	
2300	3520	
2305	3550	
2320	3580	
2360	3945	
2390	3955	
2415	3995	

$1.29 each

HAM XTALS-FT 243 HOLDERS—½" pin spc.

4190	6173	7073	1015	5800	6305	6573	7505	7650
5030	6673	7906	1179	5806	6325	6575	7540	7673
5405	5905	7940	2045	5825	6380	6600	7573	7708
5600	7140	7973	3735	5860	6373	6606	7606	8240
6073	7773	8273	5305	5850	6406	6625	7640	
6105	7806	8306	5677	5873	6440	6640		
6125	7840		5706	5875	6450	6673		
6140			5775	5906	6473	6706		
6173			5780	5960	6475	6780		
6175			5790	5973	6505	7440		
6205			5791	6273	6540	7473		

49c ea. 10 for **$4.80**

99c ea. 10 for **$9.00**

Add 20c for each 10 stats or less for postage and handling.

TERMS: All items F.O.B. Washington, D. C. All orders $30.00 or less, cash with order. Above $30.00, 25 per cent with order, balance C.O.D. Foreign orders, cash with orders, plus exchange rate.

SUN RADIO
OF WASHINGTON, D. C.
916 F STREET N.W. WASH. 4, D.C.

more highly damped ranges. Outputs are provided for independent monitoring of frequency and wow, allowing connections to recording equipment to



record the center frequency and the wow continuously, and the attachment of a spectrum analyzer or oscilloscope to examine the waveform of the frequency variation.

MOBILE AMPLIFIER

Newcomb Audio Products Co., 6824 Lexington Avenue, Hollywood 38, California has added a new phono-top mobile amplifier to its line of sound equipment.

The Model E-25MP has been especially designed for sound trucks, outdoor meetings, resorts, carnivals, parades, etc. It has inputs for two microphones and one phono input. It



consumes a minimum current per watt output. A standby switch increases the battery life and keeps tubes warm for instant use.

The amplifier has separate power and turntable switches with heavy-duty *Jones* plugs and receptacles providing dependable power connections. The entire unit is housed in a two-tone gray baked enamel cabinet with an etched metal panel.

DIRECT-DRIVE AMPLIFIER

Stephens Mfg. Corp., 8538 Warner Drive, Culver City, California has developed a new 500-ohm direct-drive amplifier and matching 500-ohm voice coil speaker system for high-fidelity sound reproduction applications.

The new "Tru-Sonic" 500D direct-drive amplifier eliminates the output transformer, thus removing all distortion introduced by transformers. Hum and noise are 90 db below full output. Frequency response is ±¾ db from 20 to 70,000 cps. Distortion is less than one-half of one per-cent at a full 20 watts of audio.

The amplifier measures 7⅞" wide,

TELEPLEX LINE . . .
1/2 The attenuation of any TV open wire line manufactured.

TELEPLEX LINE . . .
1/10 The attenuation of new, high quality 300 ohm twin lead.

TELEPLEX LINE . . .
1/20 The attenuation of 72 ohm RG59/U coaxial TV cable.

teleplex line . . . . . .
Virtually unaffected by icing, snow, sleet, rain, fog, wind, soot, sunlight, ocean salt spray or aging effects.

teleplex line . . . . . .
Weatherproof, troublefree, long life community master antenna systems and ultra long TV transmission lines.

teleplex line . . . . . .
Tensile strength 800 lbs. Makes 100', 200', 300' spans between supports safe and practicable on long lines.

teleplex line . . . . . .
Characteristic impedance 470 ohms. Tapered 30" line section matches exactly to 300 ohm TV twin lead.

teleplex line . . . . . .
Reels of 100', 250', 500' available. Standard type mast, screw, clamp standoff insulators may be used.

competitive price
TELEPLEX LINE . . .
Developed and Manufactured only by
SCOTTE GRAY INC.
Box 1001, Beverly Hills, California.

Teleplex Master Antenna Systems. Rhombics individually engineered for outermost TV fringe areas. Television field strength surveys.

Teleplex is a registered trade mark of Scotte Gray Incorporated.

15¼" long, and 7" high. It weighs 20 pounds.

Technical specifications and performance details can be obtained from the company direct.

CONTINUITY TESTER

An inexpensive, compact continuity tester which has been designed for radio-TV-electrical servicing has recently been introduced by *Howard Sales Co.*, 539 Atlantic Avenue, Brooklyn, N. Y.

The "Lumometer" measures 1¼" x 2⅜" x 3¼" and weighs just 11 ounces. It will test for opens, shorts, and continuity in radios, amplifiers, TV sets, a.c.-d.c. receivers, radio and television tubes, transformers, speakers, condensers, etc.

The unit will also check a.c. or d.c. voltages from 70 to 750 volts without switching.

A catalogue sheet describing the new unit in detail is now available from the manufacturer... —30—

International Short-Wave

(*Continued from page 48*)

Huambo, 9.705, is now heard to 1600 when closes with "A Portuguesa"; good signal lately. (Machwart, Mich.)

CR6RD is now on 7.093, heard opening "evening" session 1235; high level in parallel with the 9.705 outlet. *Radio Clube de Benguela*, CR6RB, 5.042, is on this *new* channel in parallel with 9.165; latter is best level at 1230 opening; closes 1930A. (Ridgeway, South Africa) The 9.165 outlet noted in Ohio with native musical program 0030-0100 sign-off. (Sutton)

Argentina—LRA, 17.720, good level in Arizona 1600 with news. (Earl) *Radio El Mundo*, Buenos Aires, is using LRX, 9.660, 7 kw., and LRX1, 6.120, 6 kw., to relay LR1, 1070 kc., 50 kw., daily in Spanish 0530-2235.

Australia—Perth, 9.610, noted with good signal around 0630-0745. (Ferguson, N. C.)

DX sessions of *Radio Australia* (on *Sundays*) are to British Isles and Europe 0215, 9.580, 11.760; to Western North America 0030 on 15.200, and to Africa on 21.540; to Eastern North America 0902 on 11.810, to South and Southeast Asia on 11.880, and to Africa on 9.580.

Bechuanaland—ZNB, 8.230, is scheduled 1200-1430 weekdays; 1300-1400 Sun. (*Short Wave News*, London) Noted in Britain 1325 with popular waltz music. (Catch)

Belgian Congo—OTC2, 9.767A, Leopoldville, is good level in Florida around 1830-2315. (Sherman) OTM2, 9.380A, noted with identification by woman 1500 and continuing with recordings; schedule must be extended *after* 1500 now. (Machwart, Mich.) Heard 0100-0120 with what seemed to be news in Flemish, then music. *Radio Congo Belge*, 11.720, heard around 1330 onwards. (Kary, Pa.)

Brazil—ZYP23, 5.045, Petropolis, noted with fair to good level to 2059

CHICAGO has the "specials" IN STOCK

"SPECIAL" FOR AIRCRAFT

CAT. NO. HP3-140. Three-phase 400 cycle step-down transformer Y-Y connected. Pri: 115 volts per phase, 3 phase, 400 cycle. Sec: 28.5 volts per phase, 140 va capacity. "H" type mounting; meets MIL-T-27 Grade A, Class 1 specifications. Dimensions: 2⅞x2¹⁵⁄₁₆x3¾ high.



The HP3-140 unit is just one of many "specials" regularly stocked in the CHICAGO *New Equipment Line*. CHICAGO makes a practice of *stocking* "specials" that are hard-to-get elsewhere. You'll find the answers to your transformer needs for practically any of today's circuit requirements in CHICAGO's exclusive "Sealed-in-Steel" New Equipment Line—*in stock* at leading electronic parts distributors. Whether your transformers must pass the most rigid MIL-T-27 specifications or are intended for average applications, it's wise to choose CHICAGO "Sealed-in-Steel" units (the world's toughest) for that *extra* margin of dependability under *all* operating conditions.

"Special" or "Standard"—the world's toughest transformers are in CHICAGO'S "Sealed-in-Steel" NEW EQUIPMENT LINE!



H-TYPE

Hermetic sealing meets all MIL-T-27 specs. Steel base cover is deep-seal soldered into case. Ceramic bushings. Stud-mounted unit.



S-TYPE

Steel base cover fitted with phenolic terminal board. Convenient numbered solder lug terminals. Flange-mounted unit.



C-TYPE

With 10" color-coded leads brought out through fibre board base cover. Lead ends are stripped and tinned for easy soldering. Flange-mounted unit.

All CHICAGO "New Equipment" transformers feature one-piece drawn-steel cases—the strongest, toughest, best-looking units you can buy. The one-piece seamless design, enclosing an electronically perfect construction, provides the best possible electrostatic and magnetic shielding, affording complete protection against adverse atmospheric conditions. For *every* application: Power, Bias, Filament, Filter Reactor, Audio (in 3 ranges), MIL-T-27, Step-down—there's a CHICAGO "Sealed-in-Steel" transformer, available in a choice of 3 mountings.

Free "New Equipment" Catalog

Get the full details on CHICAGO's *New Equipment Line*—covering "Sealed-in-Steel" transformers designed for every modern circuit application. Write for your Free copy of this important catalog today, or get it from your electronic parts distributor.



CHICAGO TRANSFORMER

DIVISION OF ESSEX WIRE CORPORATION

3501 ADDISON STREET • CHICAGO 18, ILLINOIS

The sensational new

GONSET "RADARRAY"

High gain on all 12 channels





No Better Antenna for FRINGE AREA RECEPTION...

The Gonset Model C "Radarray" is the first choice by manufacturers, TV Stations and technicians for bringing in a strong signal in areas where reception is difficult. No other antenna offers higher gain on all 12 channels (over 10 DB). This means greater rejection of ghosts and all types of interference, giving a clear, steady picture with a minimum of "snow."

GONSET LINE
The Original "Low Loss" Open Wire Line

GONSET LINE has the lowest loss characteristics of any line manufactured (less than ¼ the loss of molded ribbon). It is the ideal line for use where high efficiency is required — fringe TV areas, beach areas and long runs. The impedance is 450 ohms and will substitute for 300 ohm ribbon.

GONSET

See your jobber or write for circular and further details to

GONSET CO.
801 S. Main St. • Burbank, Calif.



RADIO ENGINEERING TELEVISION ELECTRONICS

Thorough training in all phases of radio and electronics, open to high school and junior college graduates. Old established school specializing in Radio training exclusively. Modern Laboratories and courses. Accelerated. Limited. Approved veteran training.

VALPARAISO TECHNICAL INSTITUTE
Dept. RD Valparaiso, Ind.

WANTED!

ALL TYPES AIRCRAFT, RADAR, RADIO SETS, COMPONENTS, DYNAMOTORS AND ASSOCIATED EQUIPMENT SUCH AS BC-348, BC-312, BC-221, R/ARN-7, TS-251, FL-50 or F-21, ARA-8 Audio Filters, TS-147, TS-148, RTA-1B, MG-149, etc.

We Pay Top Dollar!

WEST REGION ELECTRONICS, Dept. RW-1
3437 S. Norton Ave. Los Angeles 19, California



YOUR SHOP NEEDS A MICRO CIRCLE CUTTER

Quickly cuts those extra large size holes. Special tool steel cutting bits cut through 14 ga. of steel. Handy for making washers.

MODEL 9—10 inch circle $12.50
MODEL 10—15 inch circle $15.00

See your local distributor or write us.

PRECISE MEASUREMENTS COMPANY
942 Kings Highway Brooklyn 23, New York

sign-off; has QRM from phone carriers. (Ferguson, N. C.) This one has had several DX programs lately arranged by Flavio Serrano, *IBW Dept.* monitor in Rio de Janeiro, who voiced the *English*-language portions.

Bulgaria—Radio Sofia, 9.705A, still excellent evenings around 2000-2030. (Golden, Mass.) Noted opening 1315, preceded by interval signal; foreign language used; *English* noted 1500-1515 is now over 7.671A. (Ridgeway, South Africa)

Canada—VED, 7.320, Edmonton, Alberta, operates daily 0900-0200 (irregularly some days runs longer when has special programs for Northwest Territories); 5 kw. (WRH) VE9AI, 9.540, Edmonton, noted 2015-2030 with fine signal in Calif. (Flynn)

Cape Verde Islands—Kary, Pa., flashes that Praia has been noted on 7.135A from sign-on 1530 to closedown 1702.

Ceylon—Radio Ceylon, 11.975, noted with fair to good signals to 1145A sign-off. (Brown, N. Y.; Kessel, Quebec; Fuller, R. I., others) Noted on 17.730 with religious broadcast 0545; on 15.120 at 2100 with BBC news relay. (Sanderson, Australia)

Chile—Punta Arenas, 9.197A, opens 1900 with march; should sign off 2200. (Stark, Texas) CE1190, 11.900, Valparaiso, noted around 2105-2200 or later; announces "La Voz de Chile para todo America." (Ferguson, N. C.) CE1515, 15.150, Santiago, heard at fair to good level around 1930 in Spanish. (Brown, N. Y.)

China—Radio Peking noted on 15.060 beginning transmission 1700 with news. (Rosenauer, Calif.) Heard in *English* 0400-0425 on 6.100, 11.685, 15.060, 15.170, and at 0830-0900 on 11.685, 15.060. (Huntsman, Burma) *Radio Harbin*, 15.130, heard in Chinese relaying *Radio Peking's Home Service* around 1752. (Winch, Calif.)

Colombia—HJCQ, 11.680, Bogota, noted opening 0700 with woman announcer in Spanish and slogan "Radio Nacional de Colombia." (Ferguson, N. C.) HJKJ, 6.160, is often noted around 2200 announcing "Cadena Nacional;" HJEX, 6.055, Cali, noted with announcement of "Radio Pacifico" and call letters 2230; good signal in Indiana. (Niblack)

HJFU, 4.795, "La Voz del Comercio," is good 2100-2300 sign-off. (Saylor, Va.) HJCQ, 4.955, Bogota, nice level 2245 sign-off. (Gaylord, Washington State) HJCW, Bogota, listed frequency of 4.945 in verification. (Machwart, Mich.) HJCX was *measured* recently on 6.0204 at 1950. (Oskay, N. J.) Noted closing one day at 2330, another day at 0150. (Hoffman, N. Y.)

Costa Rica—TIRS, 11.975A, *Radio Athenea*, San Jose, noted 0215-0235 in Spanish; one-chime interval signal. (Flynn, Calif.) "La Voz de La Victor," 9.617, San Jose, appears to have changed call to TIDCR. (Stark, Texas)

Cuba—COBZ, 9.026, noted 2245-2315 in Spanish; fair signal, in clear. (Baugh, Quebec) COBL, 9.833, Ha-

vana, noted around 2330 in Spanish; fair level. (Lane, Wyo.) COCY, 6.450, noted at good strength 1700-1900 parallel 11.74A. (Boggs, Mo.)

Cyprus—Sharq-al-Adna, 9.650, noted around 0046 with news in Arabic by man; strong signal. (Bellington, N. Y.)

Czechoslovakia—Prague, 11.84, noted with news for USA in progress 0718, fair signal with some flutter and a heterodyne. (Bellington, N. Y.) Heard on 9.504 at 0115 with Spanish news. (Sanderson, Australia)

Prague, 9.55, noted in *English* to North America 1930-2000. (Ferguson, N. C., Kary, Pa., others.) Heard by Pearce, England, on 9.504A with *English* 1400.

Denmark—OZH, 15.180, Copenhagen, fair in Danish 0900-1000; announced in *English* 0900. (Sutton, Ohio) This one logged 0430 with news for Pacific Area. (Sanderson, Australia)

Dominican Republic—HI2A, 9.68, noted signing off 2155 with Dominican anthem; good signal but with heterodyne, probably from XEQQ; some nights has excellent volume. (Bellington, N. Y.) HI1N, 6.042, C. Trujillo, noted around 1925. (Stark, Texas) HI9T, 6.190, Puerto Plata, noted to 1855 when closed with anthem; HI1Z heard on 6.112 with popular recordings around 2239. (Machwart, Mich.) HI2T is currently on *measured* 9.7344V; noted 0710 with news in Spanish; previous measurement was 9.7363. (Oskay, N. J.)

La Voz de Fundacion, 6.150, San Cristobal, noted with identification just *after* 1745; has QRM. (Stark, Texas)

Ecuador—HC2RL, *Radio Quinta Piedad*, 6.633A, is scheduled Tuesdays *only* now 2110A-2330A. (Stark, Texas)

English programs of HCJB, Quito, include "Morning in the Mountains," 0630-0730, 12.455, 9.970; "Quito Calling," 1600-1730, 17.890, 15.115, 12.455, and "Ecuadorean Echoes," 2100-0030, 15.115, 12.455, 9.970, and on 5.995 from 2300. (Van Gilder, Mass.)

Egypt—Cairo, 9.715, is widely reported now opening 1400 with *English* news. Some days continues with *English* and other days uses French. Sign-off is normally 1600 but continues to 1700 on Saturdays.

(*Continued on page* 94)



COMMUNICATIONS EQUIPMENT CO.

ELECTROLYTIC CAPACITORS

Twist Prong Mfg.

Cap. Mfd	WVCD	Price
8	450	$0.16
30	300	.18
40	450	.30
50	400	.26
60	300	.21
80	150	.29
80	500	.43
6-8	450	.24
30-20	25	.16
20-10	150	.23
80-40	300	.27
90-10	350	.21
80-10	450	.49
150-50-25	150	.49
80-10-10-10	350	.21
40-40-20-2	150	.29
30-15-15-15	300	.29
80-10-10-10	350	.32
4-10	450-350	.55
40-20	150-25	.21
40-50	400-300	.29
80-50	450-50	.65
250-1000	10-6	.30
8-8-10	450-25	.26
10-10-10	150-25	.23
20-10-20	450-25	.29
10-15-20	350-25	.18
15-15-10	450-350	.23
16-16-25	450-50	.23
80-40-150	400-50	.65
120-60-20	150-25	.45
30-30-15-30	300-50	.30
60-40-20-20	350-15	.28
60-40-20-50	300-25	.29
60-40-20-/200	150-10	.39
60-40-20-20	150-25	.36
80-40-30-/100	150-25	.36
8-8-8	475-/100-/100	.23
10-50-/100	350-/100-/50	.23
10-/50-/100	450-/100-/50	.27
20-20-/10-/20	350-/300-/300-/25	.35

Mail orders promptly filled. All prices F.O.B. New York City. Send money order or check. Only shipping cost C.O.D. Rated concerns send purchase order. All Merchandise Subject to Prior Sale. Prices Subject to Change Without Notice.

131 LIBERTY STREET, NEW YORK, N. Y. . DEPT. N-6 PHONE DIGBY — 9-4124

NOTE: PARCELS IN EXCESS OF 20 LBS. WILL BE SHIPPED RAILWAY EXPRESS OR CHEAPEST MOTOR FREIGHT.

XMTR—RU-17—RCVR

7 Watts CW, MCW, VOICE, 2-9MC. RCVR. Range 200-13,875KC. Brand New. Complete w/all Tun. Units, Acess., Tubes, Plugs . . . **$97.50**

Write For Work Info. (Provision For D.F. Loop Attach.)

SPECIALS

SA-48/APA-1-MOTOR DRIVEN ANT. SWITCH—NEW . . . $14.08

BC-306 ANTENNA TUNING UNIT NEW . . . 4.98

RS-APN-4. New, With Tubes . . . 75.00

ABA-APN-4. New, With Tubes and Crystal . . . 75.00

A-42 Phantom Antennae . . . 6.50

2 Meter Choke, 1000 MA . . . 14 x 1.00

Supersonic Crystal Head, M-1-2, 22-27KC H-2 . . . 27.48

Underwater Microphone, Model JR. Z-50W . . . 24.50

Dynamic Mike & Headset Combo. H-19. New . . . 3.75

MS-38 Line-mtr. W-700 . . . $2.50 per ea

AN-ARC-4 VHF Trans-Rec. TS-35 TE-38 Test Set. New . . . 27.50

SCR 274 Test Set, 1-104 . . . 42.35

Carbon Pile Reg., 18V-5V 15-30Z25 . . . 1.29

ARC-1-3 Driver Trans. 6V6 to P-P 8K . . . 1.29

DM-34 Dynamotor, 14V In, 220V 80 MA out . . . 1.49

Sens. Relay, 3.3MA, 13K ohms, 2PST, 2A . . . 1.25

Klixon Breaker: Thermal, 35A, V-30 Carbon Mikes New 89

Motor, 24VDC, 3H.P., 3800 RPM, New . . . 99.75

Supersonic Rochelle Xtls 50

T-V, Loads, 300 ohms, HI-Q, Lo-Loss . . . 1000-FL, Roll . . . 17.50

Sinonic Intl. Emerg. Kmtr . . . 12.95

Screen Mod. Trans. for RIT's . . . 1.10

3-4 MC Coils for ARC-1, complete, 27247 . . . Set . . . 2.75

400 Cy Volt Reg. 8W Transfmr. 115V—400 Cy Out, 75-120V, 6A . . . 12.75

CIRCUIT BREAKERS

24V, 7A-AM1510M-7 . . . $1.98

28V, 10A, 1 POLE 98

AIR TRIMMERS

5-15 mmf, 8-85mmf, 3-35 mmf, 5-50 mmf, 2-10 mmf, 2-7 mmf . . . $0.39 ea

SHOCK MOUNT RACKS

MT-5/ARB-2/-338/FT-156/FT-487/

ARC-5 XMTR. COILS MASTER OSCILLATOR

#6029	3-4 MC	$1.85
#6030	4-5.3 MC	1.75
#6031	5.3-7 MC	1.65
#6032	7-9 MC	2.35

POWER AMPLIFIER

#7247	3-4 MC	2.19
#7250	7-9 MC	2.98

ANTENNA LOADING

#6033	3-4 MC	1.30
#6034	4-5.3 MC	1.25
#6035	5.3-7 MC	1.65
	AND 7-9.1 MC	

DYNAMOTORS

Type	Input Volts	Input Amps	Output Volts	Output Amps	Radio Set
PE86	12	3.25	250	.060	RC36
GN41G	24	0.8	250	.175	RC 10
GN53A	28	0.8	500	.250	RC 103
PE101C	12-28	12.6	400	.150	SCR-510
		6.3	800	.020	
		6.3	275	.040	
8D AR 93 38			375	.150	
233850	27	1.75	285	.075	APN-1
7A2818 13-24		0.2	1100	.010	
B-10 pack 12		9.0	275	.110	MARK11
			440	.060	
			550	.060	
D-104	12		330	.090	GCRS39
			440	.060	
DA-3A	28	10	330	.090	
			440	.060	GCRS39
			150	.010	
		14.5	9		APN-1
5053	28	1.4	250	.060	80-375
PE73CM	28	19	1000	.350	
CM21AAX	28	12.6	400	.150	
	28	6.3	800	.030	

INVERTERS

PE-218-R: Input 25-28 vdc, 92 amp. Output, 115 v, 350-500 cy volt-amperes. Dim., 17" x 11" x 10". New . . . $44.50

PE-218-M: Same as above except size: 10½" x 8½" x 10". New . . . $44.50

PE-208: Input 28 vdc, 38 amps. Output, 80 v sine-wave, 500 volt-amps. Dim., 13" x 5½" x 10½". New . . . $22.80

MG 1407: Input: 24 vdc, 36A. Output 26 v @ 250 va, 400 cy and 115 v @ 400 cy—500 va 1 phase. Used . . . $14.90

THERMISTORS

D167518	$1.59
D167332	1.59
D167613	1.59
D166229	1.59
D164699	2.50

VARISTORS

D173312	$1.59
D173155	1.59
D167176	1.59
D164627	1.59
D167206E, D171258	1.59
300A, 3A, 27.0	1.59

POWER TRANSFORMERS

Comb. Transformers—115V50-60 cps input

Stock No.	Ratings	Price
CT-770	550-0-550V/250 MA, 6.3V/1.8A	$6.95
CT-43A	680-0-680V/.08A, 2.5VCT/6A, 6.3VCT/1A	6.49
CT-152	300-0-300V/200MA, 5V/6A	3.95
CT-15A	550VCT .085A 6.3V/6A, 6.3V/1.8A	2.35
CT-164	4200V/.002A/12VV Test, 5VCT/3A/12KV Test, 6.3V/0.6A/5400V Test	$2.95
CT-341	1050V 80 MA—625V @5 MA, 25V @ 4.5A 2x2.5V 3A, 6.3V @ 3A	22.50
CR-825	360VCT .340 A 6.3VCT/3A, 6.3VCT 3A	3.95
CT-676	150EV .350 A 2.5/12.3D/.10D	$3.95
CT-378	2300V 4 MA 2.5/2	6.95
CT-367	580VCT .050 A 5VCT/3A	2.25
CT-721	550VCT .100 A 6.3/1, 2.5VCT/2	2.95
CT-99A	2x110VCT .030 A 6.3/1A, 2.5VCT/7A, 6A	3.25
CT-403	350VCT .025 A 5V/3A	2.75
CT-931	540VCT .035 5V/3A, 6.3V/6A	4.25
CT-610	1250 .002 A 2.5V/2.1A, 2.5V/1.75A	4.95
CT-137	350VCT .020 A 5V/3A	2.75
CT-666	330V .065 A 6.3V/1.2, 6.3V 600 MA	3.75
CT-416	380VCT 50 MA 6.3V/1.3A, 5V/3A	3.45
CT-150	800 VCT 100 MA 6.3V/1.2A, 5V/3A	4.95
CT-931	540VCT 85 MA 5V/3A, 6.3V/6A	4.95
CT-442	525VCT 75 MA 5V/2A, 10VCT/2A, 50V/200 MA	3.85

Filament Transformers—115V/50-60 cps input.

Item	Rating	Each
FT-674	8.1V/1.5A	$1.10
FT-157	4V/6A, 2.5V/1.75A	2.95
FT-101	6V/.25A	.79
FT-926	5.25V/21A, 2x7.75V/0.5A	17.95
FT-826	2x28V/2.5A, 36V/1A, 7.2V/7A, 6.4V/30A, 6.4V/2A	12.95
FT-483	6.3VCT/1A, 5VCT/3A, 5VCT/3A	5.49
FT-55-2	7.2V/21.5A, 6.5V/6.8A, 5V/6A, 5V/3A	8.95
FT-005	10V @ 4.5A or 12V @ 4.5A	1.75

SELENIUM RECTIFIERS

UP TO 18 VAC IN—UP TO 14 VDC OUT	
2A	$2.50
4A	4.00
6A	5.00
10A	7.00
15A	9.00
24A	10.00
UP TO 36 VAC IN—UP TO 28 VDC OUT	
1A	$3.00
2A	4.00
4A	6.00
10A	14.50
15A	20.00
24A	36.00
UP TO 84 VAC IN—UP TO 62 VDC OUT	
2A	$5.50
4A	8.00
UP TO 120 VAC IN—UP TO 100 VDC OUT	
2A	$7.00
10A	40.00
12A	46.00

Special Rectifiers On Request

Hi-Current Chokes

1 HY—12 Amp.—6 ohms . . . $14.98

.01 HY—2.5 Amp. Cased . . . $2.39

LO-VOLT. XFMRS

Primaries 115v. 60 Cycle

Sec.	WVDC	Price
6v-1.5A	500	$0.98
12v-3A	500	1.98
12v-5A	250	1.75

HI CAP. FILTER CONDENSERS

Cap.	WVDC	Price
600	15	$1.39
2000	15	1.98
500	200	1.49
250	150	1.45

UNIVERSAL POWER TRANSFORMER

Pri: Vibrator Input @ 6/12.24/110 VDC. AC Input: 110/220-V @ 60 CY.

Sec: 350-0-350 V—60 MA, 6.3V—1.8A. Completely Cased . . . **$1.49**

LIQUIDATION SALE

OUR TUBE STOCK IS TOO BIG WE MUST REDUCE INVENTORY AT ONCE, REGARDLESS OF COST

★ ★ ★

STANDARD BRAND TUBES

including such makes as

RCA, SYLVANIA, KENRAD, MOTOROLA, ADMIRAL, ETC.

Individually Boxed and Guaranteed

TYPICAL VALUES
Nearly 300 types

39/44	6AV6	1B3
29¢	59¢	99¢

6Z4	$0.59	6AK5	$1.49	6SH7	$0.95	12SA7	$0.77				
1A1	.89	6AL5	.59	6T7	1.19	12SF7	.89				
1A3	.89	6AQ5	.87	6T8	.99	12SG7	.89				
1A5	.99	6AQ6	.96	6U7	.44	12SH7	.99				
1A7	.98	6AQ7	1.29	6V6	1.59	12SJ7	.77				
1B3	.99	6AR5	.87	6V6GT	.79	12SK7	.87				
1C5	.89	6AS5	.89	6V8	1.59	12SL7	.99				
1D5	.89	6AT6	.59	6W4	.66	12SN7	.99				
1D8	.89	6AU6	1.21	6W8	.92	12SQ7	.89				
1E7	.89	6AU8	.76	6X4	.65	12SR7	.89				
1D5	.89	6AV6	.59	6X5	.59	12Z3	.75				
1F4	.89	6AX5	.99	6Y6	.96	14A7	.99				
1F5	.89	6B4	1.49	7A4	.89	14B6	.94				
1F6	.89	6B7	.99	7A5	.89	14B8	.94				
1F7	.89	6B8	.84	7A6	.84	14C5	.94				
1G6	.74	6BA6	.59	7A7	.84	14C7	.99				
1H4	.74	6BA7	.89	7A8	.99	14F7	.94				
1H5	.59	6BC5	.95	7AD7	1.49	14J7	.94				
1N5	.89	6BC7	1.17	7AF7	.89	14N7	.94				
1P5	.89	6BE6	.79	7AG7	1.95	14R7	.94				
1S5	.89	6BF5	.95	7B4	.95	19T8	1.09				
1L4	.74	6BG6	1.76	7B5	.85	20A	.87				
1LC5	1.12	6BH6	.79	7B6	.89	20L6	1.89				
1LC6	1.12	6BJ6	.76	7B8	.84	25BQ6	1.29				
1LD5	1.12	6BK7	1.15	7C4	.69	25L6	.85				
1LH4	1.12	6BM6	.99	7C5	.89	25W4	.79				
1LN5	1.12	6BN6	1.29	7E5	.84	25Z5	.85				
1N5	.87	6BQ7	1.15	7E6	.99	25Z6	.74				
1P5	1.09	6C4	.69	7E7	.99	26	.68				
1R4	.89	6C5	.89	7F7	.99	27	.74				
1W5	.82	6C6	.79	7G7	1.21	30	.76				
1S4	.74	6C8	.86	7H7	.96	32L7	1.39				
1S5	.74	6CB6	.81	7J7	1.19	33	.79				
1T4	.83	6CD6	2.39	7K7	1.15	34	.98				
1U4	.99	6D6	2.69	7L7	1.15	35	.79				
1U5	.78	6D8	.89	7N7	.99	35A5	.86				
1V	.89	6E5	1.49	7Q7	.89	35L6	.86				
1V2	.89	6F5	.88	7R7	1.04	35W4	.55				
1X2A	.94	6F6	.88	7T7	1.19	35Y4	.75				
2A3	1.49	6F7	.89	7V7	1.19	35Z5	.75				
2A4	.84	6G6	1.29	7W7	1.19	36	.49				
2A5	.84	6H6	.76	7X7	.99	37	.49				
2A6	.84	6J5	.89	7Y4	.84	38	.49				
2A7	.89	6J6	.79	7Z6	.84	39-44	.29				
2B7	.89	6J7	.81	10Y	.85	43	.89				
2B8	1.49	6J8	1.49	12A6	.79	45	.84				
2E5	.89	6K6	.89	12A8	.86	47	1.19				
2E6	.89	6K8	.66	12AH7	1.59	50A5	.96				
2Q4	.89	6K7	.74	12AL5	.76	50B5	.79				
2S7	.89	6L5	.89	12AT6	.76	50C5	.79				
3A4	.83	6L6	.99	12AT7	.99	50L6	.72				
3V4	.99	6L6G	2.64	12AU6	.79	50Y6	.99				
5Y3	1.79	6L6G	1.98	12AU7	.99	53	.96				
5U4	.83	6L7	1.19	12AV6	.69	56	.49				
5V4	.99	6N7	.99	12AV7	1.19	57	.82				
5W4	.81	6P5	.89	12AX7	.99	58	.82				
5X4	.89	6Q7	.89	12AY7	2.49	70L7	.93				
5Y3	.47	6R7	.89	12AZ7	1.59	75A	.75				
5Y4	.59	6S4	.76	12BA6	.69	76	.59				
5Z3	.79	6S7	.76	12BA7	1.19	77	.59				
6A1	1.39	6S8	.89	12BE6	.69	80	.49				
6A2	.91	6SA7	.89	12BH7	.99	81V	1.12				
6AB4	.69	6SC7	.89	12C8	.79	83	624				
6AC7	1.04	6SH7	.89	12F5	.89	85	.88				
6AC7	1.12	6SJ7	.76	12H6	.79	117N7	1.33				
6AF6	.98	6SK7	.74	12J5	.65	117P7	1.33				
6AG5	.79	6SL7	.89	12J7	.99	117Z3	.78				
6AG7	1.31	6SN7	.89	12K8	.87	117Z6	.89				
6AH6	1.29	6SQ7	.89	12Q7	.79						

FREE — NEW CATALOG JUST OFF THE PRESS

STEVE-EL ELECTRONICS CORP.

Dept. N-6 — 61 READE STREET NEW YORK 7, N. Y.

El Salvador—YSC noted 0001 on 6.075; heard another night from 2345 with marimba music; continues past 2400 most days; YSWW, 5.977A, Santa Ana, heard 2236 with music; YSUA, 6.100, heard 2321 when man announced "YSU, Radio Mil Cincuenta" (YSU is m.w. call); continued with news in Spanish. Runs to 2400; opens 0700. (Stark, Texas) YSO, 7.3142, fair 2200-2210 with music. (Lane, Wyoming, others)

Ethiopia—ETAA, 15.047 *(measured)*, Addis Ababa, noted 1235 to 1300 sign-off; mostly native (Amharic). (Ferguson, N. C.) In verifying for Kary, Pa., Bellington, N. Y., station listed channels of 15.054, 9.610, 6.419. Ridgeway, South Africa, says 15.047 is heard now rather irregularly from 1145 in parallel with 9.624A and 6.422A; stations leave air 1800.

Finland—A Finnish station is audible on 5.930 around 0530 in parallel with Helsinki on 6.120. Helsinki has *English* for Europe on 9.555, 15.190, and 17.800 at 0715-0725, and in French 0750-0800. (Radio Sweden) The *English* is scheduled for repeat to North America 2200 on same channels.

French Morocco — Radio Maroc, 6.006, Rabat, heard 1800 with call, news in French; usually signs off 1800, but one day recently ran to 1900. (Pearce, England)

French West Africa—Radio Dakar has ceased its *English* program (weekdays 1400). A new station in this country is *Radio Abidjan* on the Ivory Coast, scheduled weekdays 0145-0230, 0715-0800, 1400-1530; Sundays 0215-0300, 0715-0800, 1400-1545, using 7.210, output 1 kw. (WRH) *Radio Dakar*, 11.896A, is still noted closing with "La Marseillaise" 1800. (Niblack, Ind.) Some sources report 9.71A as a *new Radio Dakar* channel used in parallel with the 11.896A outlet.

Radio Dakar's 15.345 outlet is weak but improving throughout the 1410-1523 sign-off period with popular recorded music. (Lane, Wyo.)

Germany—WRH says RIAS, 6.005, Berlin, is now broadcasting 24 hours a day; power is 20 kw. However, Bellington, N. Y., has noted this one still has some "breaks."

Stuttgart, 15.28, noted at strong level, slight QRM, 1415-1515. (Baugh, Quebec) Nordwestdeutscher Rundfunk now has an additional short-wave transmitter, located in Berlin, 6.270A, heard to 0500. (Radio Sweden) *Radio Free Europe* has been heard on many channels in various bands lately; must be experimenting. (Bellington, N. Y.; Pearce, England; Oskay, N. J., others)

Gold Coast—ZOY, 4.915, Accra, has been heard 1100-1145 with popular music and *English* announcements; announces 61.04 m.; starts to fade around 1145; has aircraft QRM. (Flynn, Calif.) In verifying, listed this channel as in use 0945-1300. (Pearce, England)

Greenland—Gronlands Radio, 7.094A, Godthaab, noted to 1858 sign-off (one day to 1938). (Kary, Pa., Saylor, Va.) Heard signing on 1630; has musical notes for a few minutes prior to sign-on (Pearce, England) Bellington, N. Y., notes that according to *Short Wave News*, London, Godthaab, capital of Greenland, means "Good Hope."

Guadeloupe — The French-speaking station noted on 7.445A, signing off 2004A with "La Marseillaise" is believed to be Pointe-a-Pitre. After "La Marseillaise" has a short interval of guitar theme. (Kary, Pa.) Noted fading in around 1810. (Stark, Texas) May be same station Oskay, N. J., hears mornings on 7.4446 around 0615 to 0630 closedown.

Guatemala—TGNA is using *only* 9.668 and 11.850 for the *English* session nightly 2200-2230 (Wed. to 2300A). (Boice, Conn., Flanagan, N. Y.)

TGWB has been "wandering" around 6.180-6.390 lately; is listed 6.440. (Stark, Texas) TGLA, 6.295, noted 1949-2018 with marimba band music; All-Spanish.

Haiti—4VM, 6.005, Port-au-Prince, noted with call in *English* 1825, then with program of recordings. (Ferguson, N. C.)

Holland—Radio Nederland, Hilversum, hopes to have its new 100 kw. transmitter in operation next year (1953). (van Eekeren, Oregon-Holland)

(Continued on page 125)

Spot Radio News

(Continued from page 18)

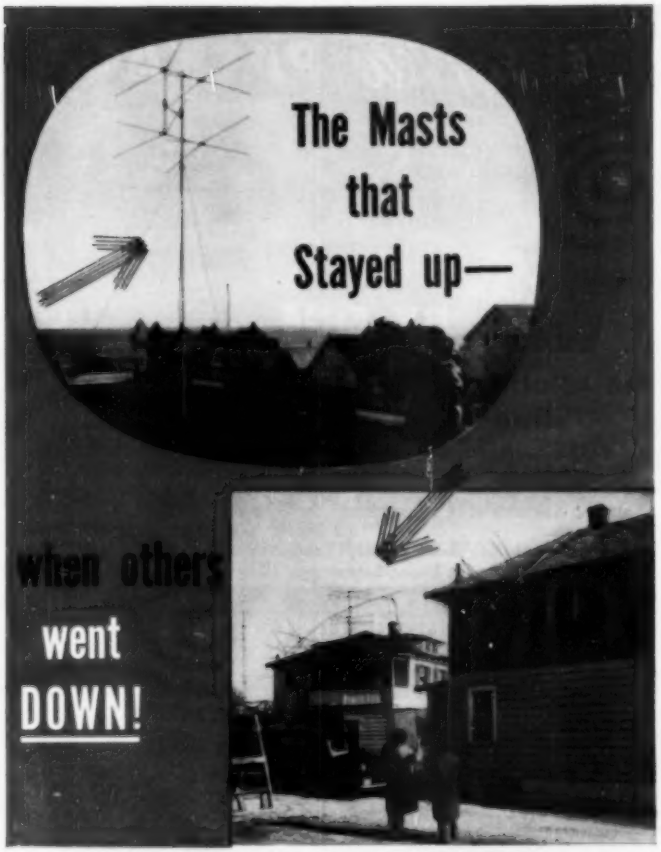
zone. For instance, in zone I, encompassing the states of Massachusetts, Rhode Island, Connecticut, New Jersey, Maryland, Pennsylvania, Delaware, District of Columbia, Ohio, Indiana, Illinois and parts of Maine, New Hampshire, Vermont, New York, Virginia, West Virginia, Michigan, and Wisconsin, the co-channel assignment separations are 170 miles for the 2 to 13 stations, and 155 miles for the upstairs TV stations. In zone II, the separations were increased to 190 miles for the low-band stations and 175 miles for the 14 to 83 stations. This zone includes Kentucky, Tennessee, North Carolina, South Carolina, Missouri, Iowa, Minnesota, Arkansas, Kansas, Nebraska, Oklahoma, North Dakota, South Dakota, Utah, Idaho, Arizona, New Mexico, Montana, Wyoming, Nevada, Colorado, Oregon, Washington, and California, and parts of Maine, New Hampshire, Vermont, New York, Virginia, West Virginia, Georgia, Alabama, Mississippi, Louisiana, Michigan, Wisconsin, and Texas. A further increase in separation appears in zone III, which includes Florida and parts of Georgia, Alabama, Louisiana, Mississippi, and Texas. Here the very-high channels have been spaced 220 miles and the ultra-highs, 205 miles apart.

Some states were very fortunate in the allocation schedule, receiving quite an allotment of channels. California won 84 channels; Illinois over 100, and Texas around 150 in 117 communities. In contrast, New York found itself with only 60 channels in 35 areas.

It had been assumed that the educational stations would only receive channels in the higher bands. However, because of the striking campaign waged by the educators, a healthy slice of the very-high band was also set aside for them. Specifically, 80 v.h.f. channels are now available for schools and over twice that many or 162 u.h.f. channels can also be used for instruction. The assignment of the lower bands for the educators has irked many. In Boston, where Channel 2 was assigned for teaching, stormy protests have been made. During the hearings, *CBS* had opposed the reservation of the channel for educational use, stating that the scholastic interests were not ready to proceed with the construction of a television station, and the educators were not interested in a mass audience and thus would readily use an ultra-high channel for their minority type audience. Supporting the need for the channel for teaching, the members of the Lowell Institute Cooperative Broadcasting Council of Boston, consisting of Boston College, Boston University, Harvard University, Lowell Institute, MIT, Northeastern University, Tufts College, and the Boston Symphony, declared that it has had extensive experience in the fields of radio, through its FM station WGBH, and television, and was prepared to meet the responsibilities of television broadcasting. They indicated that they were more than confident that they would be able to secure the necessary funds to operate a station and they could provide programs that would be of interest to a wide audience. The plea of the council was soundly supported by such personalities as Senators Henry Cabot Lodge, Jr., and Leverett Saltonstall, as well as Congressman Christian A. Herter. The City of Boston and the Commonwealth of Massachusetts also echoed support for the proposal.

In New York, criticism of the educational assignments has also appeared, although no low bands were set aside for that purpose. The strong plea made by the Board of Regents of the University of State of New York won quite a block of attractive channels: 14, 17, 21, 23, 25, 43, 46, 66 and 83. The Board noted that they proposed to utilize the resources of more than 8000 state educational and cultural institutions to afford educational opportunities to more than 91 per-cent of the population of the state. It was also indicated that a television network would be established at a cost of $3,855,540, with an annual technical operating cost of $2,273,941, based on 16 hours of operation Monday through Friday, and 12 hours on Saturday and Sunday. Programming would be apportioned among public and private institutions under state supervision, with costs being borne by participating institutions supplemented by state aid.

THE REPORT was harshly criticized by Commissioner Jones, who in a dissenting opinion struck out at the Com-



PERMA-TUBE

. . . the Steel Television Mast that's UP to STAY!

. . . it was a *big blow*—the hurricane of November 1950 that hit the New York area with devastating force. Television masts were crumpled and flattened like straws in the path of the wind . . . all but those made of PERMA-TUBE. PERMA-TUBE Masts *Stayed Up!* . . . and why did PERMA-TUBE Masts *stay up?* For the very good reason that they're made of sturdy, corrosion-resistant steel . . . Jones & Laughlin Television grade PERMA-TUBE Steel . . . a product that is pre-treated with Vinsynite and coated with a metallic-pigmented vinyl resin base *inside and outside.*

. . . what's more, they're easily, quickly and economically installed. Their new Fitted Joints can be slipped together in a matter of seconds. And you can obtain PERMA-TUBE in standard lengths, diameters and wall-thicknesses.

FOR COMPLETE INFORMATION—MAIL THIS COUPON TODAY!

J&L STEEL

Jones & Laughlin Steel Corporation
493 Jones & Laughlin Building
Pittsburgh 30, Pennsylvania

Without charge please send me:—

☐ Name of nearest distributor
☐ Complete information on Perma-Tube

NAME _____

COMPANY _____

ADDRESS _____



the solution for *all* your high voltage TV filter replacement problems

• This package contains six (6) Style 413 Erie Universal High Voltage TV Filter Ceramicons and an assortment of 14 adapter terminals.

Carry one of these handy package assortments with you on all your TV service calls. You are assured of having, at all times, the CORRECT REPLACEMENT UNIT for any receiver rated at 20 KV or lower.

Order through your jobber.

Electronics Division
ERIE RESISTOR CORP., ERIE, PA.
LONDON, ENGLAND . . . TORONTO, CANADA

Prerequisite to
Natural Reproduction of Music
BROOK
ALL TRIODE HIGH QUALITY
AUDIO AMPLIFIER

The BROOK will play at extremely low volume, yet retain full naturalness of tone; or, recreate in your home the full volume of a symphony, or dance band, clear and clean. You will hear and FEEL live music and voices.



Write for technical data booklet
Better Listening
and name of local dealer Dept. RF-2

BROOK ELECTRONICS, INC.
34 DeHART PLACE, ELIZABETH 2, N.J.

THIS PRODUCT



IS KNOWN AS THE

ASPIRIN
OF THE
RADIO SERVICE
INDUSTRY

IT IS THE ORIGINAL NON-CONDUCTIVE, NON-INFLAMMABLE LUBRICANT & CLEANER

THAT TAKES THE HEADACHE OUT OF NOISY
TV & RADIO
CONTROLS & SWITCHES
WITHOUT REMOVAL FROM CHASSIS

ORDER FROM YOUR DISTRIBUTOR

MFD. BY
QUIETROLE COMPANY
SPARTANBURG SOUTH CAROLINA

mission's power-antenna plan, the fixed inflexible allocations and coverage predictions.

The power-antenna values, which are to be used by broadcasters everywhere from New York City to Goldfield, Nevada, with a population of only 336, warned Jones, means that . . . "there is a million-dollar entry fee for every broadcaster to guarantee the Commission plan's efficiency." He felt that the plan throws the heaviest financial burden upon those least able to pay. The "u.h.f. transmitters cost more to construct and operate," he said, "and u.h.f. receivers cost more." Initially, he pointed out, the u.h.f. receivers will not be as good as the very-high receivers and more complicated and more expensive receiving antennas will be needed to pick up a usable ultra-high signal.

"The Commission's plan will make the television broadcasting business a million-dollar blue chip game, as a result of the powers and antennas chosen for its level of efficiency," Jones added. In his opinion, the . . . "corollary of this philosophy is that those powers and antenna heights require abnormally, if not unreasonably wide separations. The wider the v.h.f. separations are, the less channels there are in any given city. In short, if the Commission is creating an artificial scarcity of v.h.f. channels . . . The Commission thinks it has eliminated . . . the contest between cities (it has not eliminated them at all) by incorporating this firm, fixed, and final allocation plan into its rules. But it has created a bigger Frankenstein with this artificial scarcity of channels than it is trying to avoid. Where the prospect of million-dollar returns are at stake in major markets, more applicants will be seeking a scarce number of channels. When many applicants compete for an unconscionably few v.h.f. channels with the lucrative return on investment provided by this plan (inordinately v.h.f. service areas), it will take years before the Commission can judge the merits on the kind of contests that will surely ensue."

Declaring that the mileage separations cited in the plan, were not . . . "based upon engineering principles at all . . . but on a policy decision . . . for specific size areas for television stations," the critical Commissioner noted that . . . "all of the engineering for this plan is subordinate to and complementary to this non-engineering policy decision."

Berating his fellow Commissioners for their views on coverage, Jones said: "The Commission blows hot and cold on two sides of the same proposition. On the one hand, it says that maximum rural coverage is obtained with wide spacings and on the other hand, it says that if you have a large number of cities close together, you can get larger rural coverage by the use of many stations on different channels because . . . 'there would be an overlapping of service contours and

(Advertisement)

HOW EASY

can YOU make tv servicing?



Try this simple rule used successfully by thousands of service technicians.

Take advantage of the set manufacturer's service literature.

This is the key to easy, successful servicing which is overlooked by a surprising number of service technicians. They believe, strangely enough, that the more oversimplified the data they purchase the less their servicing problems. They think that because the servicing information on a set is condensed, that data will be easier to work with. How wrong this approach is can be measured by the fact that servicing data *in itself* is worthless. Its only value comes from its use as a guide to receiver diagnosis and repair. Doesn't it make sense then that the most complete data will be the best because it makes your diagnosis and repair job easier?

Rider data is complete data with a bonus!

For 22 years Rider has been the only publishing source for complete, factory issued, official servicing data. From large, easy to follow schematics...circuit explanations...stage by stage alignment curves...page after page of trouble-shooting test patterns...waveforms...clear, enlarged chassis views...circuit changes...to complete unpacking instructions; Rider gives you the complete story including all manufacturer's production changes...in accurate, organized, unedited form. PLUS A NEW FEATURE: A LISTING OF ABSOLUTELY GUARANTEED REPLACEMENT PARTS. The parts listed must meet the physical and electrical performance ratings of the original equipment used in the receiver ...or you get your money back. (Look for this new Rider feature beginning with Rider TV Manual 10 and Rider TV TEK-FILE Pack 57.)

Rider Servicing data available two ways!

Rider TV Manuals Vols. 1 to 9

Complete data for manufacturer's receivers produced during a certain period. (The newest, TV 9, (just published) covers October 1951 through February 1952.) Each manual contains over 2000 (8½ x 11) pages in permanent binder, with an index covering the contents of all manuals. Manuals are perfect for shop use and permanent reference. Price **$24.00** each.

Rider TV TEK-FILES Packs 1 to 56

The contents of a typical TEK-FILE Pack are pictured below. In TEK-FILE Packs you buy complete Rider servicing data for only one, two, or a few manufacturers according to your needs. Notice that each pack is made up of standard file folders for easy use. Only **$2.00** each pack.

TEK-FILE EXTRA.

Many packs contain TEK-FILE Handies...3 x 5" index cards giving manufacturer's trouble cures plus production changes. Vital data for permanent repairs!

DON'T BE SWITCHED!

Rider TEK-FILE is *Not* the same as any other publisher's service. If your jobber doesn't carry them DON'T BE SWITCHED. Write us direct...We'll sell you. *(Please include your jobber's name.)*

TRY A PACK

To judge TEK-FILE'S superiority, buy one pack for the next receiver you service. If you don't agree it's best...return



the pack to us within seven days and we'll send you a full refund. TRY ONE TODAY!

FREE Rider TEK-FILE indexes are at your jobber's. If he's out, write us.

OUT SOON!

Rider *RADIO* TEK-FILES! Same style as TV TEK-FILES. Now, get your complete radio servicing data this easy, economical package way. Ask your jobber.

John F. Rider Publisher, Inc. 480 Canal St. New York 13, N. Y. West Coast office: 4216-20 W. Jefferson Blvd. Los Angeles, Calif.

USE PHOTOFACT

the world's best Radio and TV Service Data . . .



WE'LL PROVE YOU'LL SAVE TIME and EARN MORE WITH PHOTOFACT

FREE **Service Technicians:** We'll send you any Photofact Folder listed in the "PF INDEX and Technical Digest." If you haven't an Index, get a free copy from your local Photofact distributor or write for it today. To obtain Free Folder, be sure to state Photofact Set and Folder Number as shown in the Index.

NOW—learn for yourself how PHOTOFACT makes your Radio and TV work *quicker, easier, more profitable!* Just get and use an actual PHOTOFACT Folder. Discover why over 35,000 successful service technicians count on this invaluable data daily. No other service gives you PHOTOFACT'S *completeness, accuracy, uniformity* and *lowest cost*. PHOTOFACT is the *only* Radio-TV service data prepared from laboratory analysis on the actual equipment. Get your FREE Folder now. Examine, use, compare. See why you can't afford to be without PHOTOFACT!

NOTE: Our FREE Folder offer is limited to Service Technicians only. Attach coupon below to your letterhead and mention your jobber's name. Experimenters and others may obtain the Photofact Folder by remitting amount shown below.

HOWARD W. SAMS & CO., INC.

HOWARD W. SAMS & CO., INC.
2201 E. 46th St., Indianapolis 5, Ind.

☐ I am a Service Technician. Send me Free Folder No. ..... which appears in Photofact Set No. ..... (as listed in the PF Index).

☐ I am an Experimenter. Enclosed $ ..... Send me Folder No. ..... which appears in Photofact Set No. ..... (TV—$1.00. AM, FM—50c. Record Changer or Communication Receiver—75c)

Name .....

Address .....

City ..... Zone ..... State .....

EASY PAY PLAN! **PAY AS YOU EARN! Ask your distributor about this amazing plan. Only $18.39 puts the entire profit-boosting Photofact library in your shop now!**

a multiplicity of alternative services." The question unanswered by the Commission is: Why did it persist in wide spacings in constructing the zone I portion of the table? As a matter of fact, from the standpoint of efficient channel coverage, there is no answer because the actual assignments have moved toward maximum single station efficiency instead of total maximum channel efficiency. Therefore, this firm, fixed, and final allocation plan, shrinks the available seven high-band channels used at the median spacings of 280 miles actually employed in constructing the table, and gives no more coverage than three of the same group of channels if 155 miles optimum spacing were employed."

In a concluding seething commentary on the defects of the plan, Jones said: "Efficient distribution of channels and the provision of maximum number of television stations have been sacrificed to achieve a misleading appearance of simplicity of administration. The public interest, convenience, and necessity have been abandoned to the theoretical convenience of the Commission. The small communities are to be subjected to rules drawn upon considerations applicable primarily or wholly to larger cities. The apparent simplicity of administration is an illusion that will disappear as soon as the number and complexity of conflicting applications under the standards emerge."

Madame Commissioner Frieda Hennock also felt that the sixth report was improperly drawn in many respects. She viewed that the granting of increases in power and height . . . "unduly and unnecessarily enhanced the v.h.f. at the expense of the u.h.f." Calling the u.h.f. a new and experimental portion of the spectrum containing the bulk of the TV channels, with its use so necessary to a national system, she said that the . . . "Commission should not hinder its development by adding to the advantage held by the already highly developed v.h.f." In her opinion, the Commission should encourage u.h.f. ". . . in every way possible so as to aid in its development, establishment and eventual growth into an integral part of a truly nation-wide television system."

The one-year reassignment plan was also censured by Miss Hennock who felt that with the . . . "anticipated heavy demand for frequencies, the equal right of all parties to petition . . . for these channels and particularly the lack of any definite criteria under which the Commission could withhold them against such demand, it is likely that most unassigned channels will be preempted by larger cities which already have multiple television assignments." She did not believe that . . . "we should so encourage the early appropriation of these channels at the expense of smaller communities, which may in time be able and eager to support a local television station."

The alarm over the inequities, appearing in the report, expressed by Commissioners Hennock and Jones, did not seem to disturb many, who viewed the assignments and standards as a plausible and intelligent approach to an extremely difficult problem. The consensus was that both the very-highs and ultra-highs will prosper and on a nation-wide equitable basis.

A FEW DAYS before the sixth report appeared, Washington and the communications world at large were saddened by the death of former Senator Wallace H. White, Jr., who co-authored the 1927 act, which not only set up the old Federal Radio Commission, but was the basis for the Communications Act of 1934. His passing shocked many, particularly broadcasters who will be forever indebted to him for his leadership in preparing the basic laws that have served the broadcasting world and the public so well for over twenty-five years. The striking growth of broadcasting and TV, too, is stirring testimony to his vision and conception of the long-range requirements of the listeners and viewers of the nation. Everyone will miss his friendly smile and constantly helping hand. . . . . L.W.

Loudspeaker Enclosures

(Continued from page 55)

reflex has the advantages of being simpler and less expensive to construct, and can be tuned over a certain range by adjusting the vent opening.

Corner Folded-Horn Cabinets

A type of loudspeaker cabinet which is becoming widely used because of its good low-frequency response is the folded-horn cabinet. In this type of cabinet the sound is radiated from the front of the speaker cone at high frequencies and through a horn coupled to the back of the cone at low frequencies. For home use, it is generally designed to be placed in a corner of the room so that the walls and floor form part of the horn.

The horn is used in loudspeaker applications because it is the acoustical equivalent of the electrical transformer. Since at low frequencies the air represents too low an impedance for proper coupling to the loudspeaker cone, the horn can be used to transform this low impedance to a higher impedance which permits more efficient energy transfer. Generally a volume of air is maintained between the loudspeaker and the entrance to the horn, to act as an acoustic capacity which bypasses the horn at higher frequencies so that all the high-frequency sound radiation is from the front of the speaker. With the use of properly designed corner folded-horn cabinets, frequencies as low as 20 to 30 cps can be reproduced using standard commercial loudspeakers in cabinets of practical sizes.

The details of construction of a typical corner folded-horn cabinet are shown on the "Data-Print." Practical

dimensions are given for the construction of such cabinets for use with commercial 12-inch and 15-inch loudspeakers. No dimensions are given for use with smaller speakers, since the major usefulness of the horn is with speakers that are capable of producing the very low frequencies at which the horn coupling to the air is most useful.

General

In the construction of the various loudspeaker cabinets which are described on the "Data-Print," a number of precautions must be taken to obtain proper performance:

1. In assembling cabinets, all mating joints should be securely glued and screwed together. Cracks or holes should be filled with plastic wood.

2. Large surfaces of the cabinet should be stiffened on the inside to prevent low-frequency vibrations. Stiffening braces should be fastened to such surfaces to eliminate any low-frequency resonances. When surfaces are tapped, only highly-damped high-frequency vibrations should result, and various sections should have different resonant frequencies.

3. Interior of cabinet should be padded to prevent standing waves from being set up. Absorbing material should be placed directly behind the loudspeaker, and one of each two opposing surfaces should be covered over most of its area with absorbing material.

4. Grille cloth should be as light weight and porous as possible, for minimum loss of high frequencies.

For the experimenter who does not have extensive woodworking facilities at his disposal, some of the cabinet types which have been described are available in commercial kits whose dimensions are very similar to those given on the "Data-Print."

The cabinet dimensions which are given in the tables may be changed to suit individual space requirements, provided certain precautions are taken: in the infinite baffle cabinet, the total internal volume should not be decreased. In the bass reflex cabinet, the over-all dimensions may be changed, but the internal volume and the vent area must be kept the same. In the labyrinth, the cross-section and length of the resonant tube must be kept the same. In the corner folded horn, the cross-sections of the horn must be maintained.

If the loudspeaker is placed in the proper cabinet, constructed according to the information given in this article, and the proper precautions taken in the construction of the cabinet, the good sound quality which the loudspeaker is capable of producing will be obtained. There will be no resonances in the frequency response and the cone will be properly damped for best transient response. With a good electronic system, such a loudspeaker system will be capable of a naturalness and clarity of reproduction which could otherwise be attained only by expensive commercial systems.

-30-

LOW PRICE is Proved by FIGURES NOT BY WORDS!



Compare PENN'S current price list with that of any other Tower Maker



Today, almost every television tower *advertisement* contains the words "low price." So—Teletower invites you to judge by the actual figures as shown on the *price lists*. Get Penn's current prices —and make your own comparison.

Teletower keeps the lead in tower sales because it incorporates design and construction advantages while holding its edge in price. Here are some Teletower "firsts":

(1) adjustable roof mount that saves money and weight (2) universal motor mount adaptable to all antenna rotors (3) straight top section for easier climbing (4) built-in base that permits raising tower after fastening base to roof (5) pilot hole that automatically aligns sections when just one leg is properly fitted.

Find out who gives you what for your money . . . and what you really pay to get it. Remember the prices on your *Penn* price list include delivery to your door—all freight paid. Mail the coupon now.

CANADIAN REPRESENTATIVE: Atlas Radio Corp., Ltd., 560 King Street, W. Toronto, Canada



Penn Tele-Poles with Exclusive Base Mounts

Made of high grade steel tubing. PBM 5 base permits mounting on peak of ridge so erection can be made either from ridge or side.

Penn Boiler & Burner Mfg. Corporation, Department N, Lancaster, Pa.

Please send me complete information on Penn Teletowers, including most recent price list.

Name .....

Address .....

.....

PENN Teletowers Thriftowers Fenna-Mast Hardware

PENN BOILER & BURNER MFG. CORP., LANCASTER, PA.

"PACKAGED ENGINEERING" at Its BesT! For the TV Technician

The B-T MIXER-AMPLIFIER SYSTEM



Model MA4-1

For All VHF and UHF Multi-Antenna Problems

Designed for the Service Technician to enable him to plan and make any installation . . . whether a single receiver or a complete 2000-set Master Antenna System . . . at lower cost, and without outside engineering.

The B-T MA4-1 is a wide-band, all-channel TV signal mixer for feeding 3 antennas to 1 TV receiver or distribution system. One input is broad-band for signals requiring no pre-amplification, and the remaining 4 accommodate separate plug-in strip assemblies. All terminals have 75 and 300 ohm connections. Several units may be ganged to serve any number of antennas.

B-T PLUG-IN STRIPS

Channel Strip CS-1 is a 2-tube (6AB4-6CB6), single channel, highly selective amplifier with a gain of at least 17 db., one strip for each TV channel.

The UHF Converter, UC-1 is designed for lowering UHF signals to existing TV frequencies, permitting UHF reception on present TV receivers.

Eliminates all need for rotators, separate boosters, converters, and other costly projects.

Once connected the MA4-1 performs without further attention . . . no switching . . . no adjustments.

LIST PRICES:

Model MA4-1 (less plug-in strips) $32.50
Channel Strip CS-1 (specify channel) 10.50
UHF Converters UC-1 ..... to be announced
Standard RTMA Warranties Apply.

B-T LABS

For the Complete 'Packaged Engineering' story, ask about B-T Signal Amplifiers and B-T Distribution Amplifiers at your local Distributor, or write to Service Department, F

BLONDER-TONGUE LABS. inc.
Mount Vernon 6, New York

RADIO-TV Service Industry News

AS REPORTED BY THE

TELEVISION TECHNICIANS LECTURE BUREAU

MOST of us are inclined to gloss over statistics of potential business volume on a national scale because we can see no direct relationship between the millions of units or dollars that represent the total market and the few thousands of dollars of that market that we manage to get as our share of it. We feel that these fabulous figures are probably all right for big manufacturers but hold no real meaning for helping us to manage our small businesses. But sometimes the application of a little simple arithmetic in connection with some of these national statistics will provide some very useful information, particularly helpful in gauging how our particular business compares with the average business of its kind.

Recently, the *General Electric* Tube Department released some very interesting statistics that were developed in one of the broadest surveys ever made of the market for replacement tubes for television sets and home and car radios. For instance, this survey indicated that the receiving tube industry is about to pass a major landmark. More than 950,000,000 receiving tubes are now in operation in television receivers and home and car radios, and the total is expected to pass the one billion mark within the next few weeks.

Well, a billion sockets which will require replacement tubes at varying intervals represent a lot of sockets. And they also represent a big potential market for replacement tubes and associated service. In terms of individual service shops, it means that if the maintenance of these electronic circuits was evenly divided among all of the service shops now estimated to be in business, each shop would have a total of more than 28,000 sockets to maintain.

The survey showed that about 1,100,000 picture tubes worth $44,000,000 will be sold this year as replacements. On the basis of the number of TV service businesses that are currently estimated to be in operation this replacement business, if evenly divided among them, would sell one hundred tubes at a gross volume of $4000 per shop during this year.

The replacement market for receiving tubes this year is said to be 110,000,000 tubes worth $220,000,000. In terms of radio and television service shops, this would provide an average potential of 3100 tubes per shop during 1952. This represents an average of 60 tubes per shop per week for a total weekly gross income of $120.00. On the basis of technicians now working on maintaining electronic equipment, this potential would represent an average of thirty tubes per week for each technician.

Figures like these show the tremendous business potential that is available to service shops that will merchandise and sell the maintenance and service facilities they have available. It is highly probable that if, on a national scale, the service industry aggressively sought to repair the crippled radios and other electronic devices that are in use in homes, the market for replacement receiving tubes would exceed the estimates shown in the *General Electric Company* survey.

New TV Stations

Now that the three-and-one-half year freeze on TV station construction has been lifted, manufacturers are turning their attention to the development of u.h.f.-v.h.f. combination receivers that will receive both the present 12 v.h.f. channels and the 70 new u.h.f. channels that have been provided. A number of manufacturers have announced that they are going into production on u.h.f. tuners which will enable the present owners of 16 million v.h.f. TV sets to receive u.h.f. programs on their present receivers.

In lifting the freeze, the Federal Communications Commission announced that it would not start to

A COMPLETE Directory of Service Associations, together with the names and addresses of their present officers, is being prepared for publication in late summer. All service associations are urged to write to: Service Editor, RADIO & TELEVISION NEWS, 366 Madison Ave., New York 17, and send a complete list of officers.

New Low Prices Largest Stock TUBES and PARTS

All TUBES are guaranteed for one year . . individually boxed.
10% DISCOUNT on orders of 100 tubes or more, all brands.

TUBE SPECIALS!

6AU6	ea. 59c	6SK7GT	ea. 58c
6V6GT	ea. 59c	6BQ6GT	ea. 85c
12AU7	ea. 65c	6CD6G	ea. $1.69

Quantity		Quantity		Quantity		Quantity		Quantity	
0Z4	59c	6AB7	$1.35	6J5GT	$ .54	7A6	73c	12BE6	$ .65
0Z4G		6ACSGT	1.31	6J6	1.04	7A7		12BF6	.59
1A5GT	.65	6AC7		6J7G	.79	7A8		12BH7	1.08
1A7	.99	6AG5	1.15	6J8G	1.15	7B4		12C8	1.15
1B3GT	.95	6AG7	1.44	6K5GT	.87	7B5	.73	12F5GT	65c
1B5	29c	6AH6	1.40	6K6GT	.59	7B6	.73	12H6	
1C7G		6AK5		6K7GT	.79	7B7	.73	12J5GT	.54
1E7		6AK6	1.08	6K8GT	.87	7B8	.73	12K7GT	.79
1H6		6AL5	72c	6L5G	.95	7C4	1.30	12Q7GT	.65
1H5GT	.65	6AQ5		6L7	.87	7C5	73c	12SA7GT	.72
1H6G	1.15	6AQ6	.81	6N6G	1.40	7C6		12SC7	.79
1J5GT	.95	6AR5	.74	6N7GT	1.08	7C7		12SF5GT	72c
1L4	.59	6AT6	.54	6P5GT		7E6	.89	12SF7	
1LA4	1.19	6AS5	.90	6Q7GT	.65	7E7	1.07	12SH7GT	.79
1LA6		6AUSGT	1.45	6R7GT	.95	7F7	.89	12SK7GT	.72
1LC5		6AU6	59c	6S4	.65	7F8	1.47	12SL7GT	.87
1LC6		6AV6		6S7GT	1.15	7G7	1.07	12SN7GT	.99
1LD5	.95	6B4G	1.44	6S8GT	.95	7H7	.81	12SQ7	.54
1LE3	1.15	6B5		6SA7GT	.72	7J7	1.07	12SQ7GT	.59
1LH4	1.19	6B6G	.79	6SC7	99c	7K7		12SR7GT	.79
1LN5	1.19	6B8GT	1.15	6SD7GT		7L7		12Z3	.95
1N5GT	.72	6BA6	.65	6SF5	.59	7N7	.89	14A7	.89
1P5GT	95c	6BA7	.87	6SF5GT	.65	7Q7	.86	14AF7	.93
1Q5GT		6BC5	.72	6SF7	.72	7R7	.89	14B6	89c
1R5	72c	6BC7	.79	6SH7GT	.79	7S7		14B8	
1S5		6BDSGT	1.15	6SJ7	81c	7V7	1.07	14C5	1.07
1T4		6BE6	.65	6SJ7GT		7W7		14C7	.98
1U4		6BF5	.59	6SK7GT	.58	7X6	.89	14F7	.89
1U5	.65	6BF6	.59	6SL7GT	.87	7X7	1.07	14F8	1.30
1X2A	.95	6BG6G	1.73	6SN7GT	.79	7Y4	73c	14S5	.81
2A3	1.15	6BH6	72c	6SQ7	.54	7Z4		14SJ7GT	.81
2A5	.79	6BJ6		6SQ7GT	.59	12A7	1.15	19BG6G	2.35
3LF4	1.19	6BN6	1.44	6SR7GT	.65	12A8	.79	19T8	1.04
3Q4	.79	6BQ6	.85	6SS7	.72	12AH7	1.45	20	1.40
3Q5GT	1.08	6BQ7	1.58	6T7G	1.15	12AT6	.54	24A	.79
3S4	72c	6C4	59c	6T8		12AT7	1.04	25AC5GT	1.04
3V4		6C5GT		6U5	1.10	12AU6	.72	25BQ6GT	1.15
5T4	1.40	6C6	.79	6U6GT	79c	12AU7	.65	25L6GT	.59
5U4G	.59	6C8G	1.15	6U7G		12AV6	.54	25W4GT	.72
5V4G	.87	6CB6	.72	6V6GT	.59	12AV7	1.15	25X5	1.04
5W4	59c	6CD6G	1.69	6W4GT	.65	12AW6	.95	25Z6GT	.79
5W4GT		6D6	.79	6X4	.54	12AX7	.87	32L7GT	1.15
5X4G	.65	6D8G	1.15	6X5GT	.68	12BA6	.65	35A5	.99
5Y3GT	.45	6E5	.79	6Y6G	.87	12BA7	.87	35B5	72c
5Y4G	.54	6F5GT	59c	7A4	.81			35C5	
5Z3	.81	6F6GT		7A5	.89			35L6	.59
6A3	1.15	6F8G	1.15					35W4	.45
6A7	1.21	6G6G	.95					35Y4	99c
6A8GT	.99	6H6	.59					35Z3	
		6H6GT	.65					35Z4	54c
								35Z5	
								35Z6G	.95
								35 51	.79
								41	72c
								42	
								43	
								45	
								45Z5	.59
								46	1.04
								47	1.21
								50A5	72c
								50B5	
								50C5	
								50C6G	1.04
								50L6	.59
								50X6	.79
								50Y6	.59
								70L7	1.40
								71A	.87
								75	1.10
								77	
								78	
								80	.61
								83	1.45
								85	.79
								117L7	1.40
								117N7	
								117P7	
								117Z3	.54
								117Z6	1.08
								807	1.55
								813	8.95
								1294	29c
								1299	
								1619	.45
								1629	.29
								2050	2.00
								2051	1.15
								7193	.87
								VT51	29c
								VT52	

TUBE KITS

BEST BRANDS at BEST PRICES

3Q4, 3Y4, 1R5, 1S5, List Value $4.98. Tube Kit only	$2.39
1S4, 1T4, 1S5, 1R5, List Value $7.88. 4 Tube Kit	$2.39
1U4, 3S4, 1S5, 1R5, List Value $7.85 All Four Tubes for	$2.39
3V4, 1R5, 1S5, 1T4, List Value $7.80. All for	$2.39
117Z3, 1U5, 3V4, 1R5, 1T4, AC-DC Portable Kit. All for	$2.89
12AT6, 12BA6, 12BE6, 35W4, 50B5 5 Tubes for	$2.95
10L6GT, 15Z5GT, 12SQ7GT, 12SK7G, 12SA7G. 5 Tubes for	$3.22

TV PICTURE TUBES

Six month guarantee

10BP4	$13.95	16GP4	$29.95
12LP4	$18.95	16JP4	$29.95
12LP4A		16RP4	
14PB4	$22.95	16TP4	$23.95
7JP4	$16.95	17BP4A	24.95
16AP4	$29.95	19AP4A	$39.95

P. M. SPEAKERS



12" Coaxial PM Speakers **$12.95** ea.

High fidelity with high pass filter attached. 20 watt; 40-17500 cps. response; 8 ohm VC.

Very best quality—NATIONAL BRANDS Individually Packed

3"	$1.26 ea.	8"	$3.23 ea.
4"	1.36	10"	5.10
5"	1.59	12"	6.54
6"	Special Price		$1.59 ea.

Fringe Area DOUBLE "V" TV ANTENNA KIT

High Gain, Best Pictures Possible . . . complete with 300 ohm line, insulators, guy wire, hardware, full size antenna with double length 9 ft. mast

$7.95 complete

RESISTOR KITS

Insulated ½, 1 and 2 watt assortment of most used values, best brands. 100 for **$4.95**

50 asst.—$2.95

TWIN LEAD

300 ohm twin lead 99 Web virgin polyethylene, in either clear or brown, the finest available.

1000 ft. $18.50 | 100 ft. $1.95

Get our special sales bulletins . . . write TODAY!

6-FOOT LINE CORD

UL approved, cord and plug—

10 for . . $1.95

3 speed G. I. CHANGER complete, ready to install **$24.95**

TV INLINE FOLDED DIPOLE ANTENNA

At this price we cannot mention manufacturer's name, complete with mast, ind. boxed. $6.95 each

6 for $6.29 each.

TERMS: 20% DEPOSIT with order, balance C. O. D. $1.00 handling charge for orders less than $5.00. All shipments F. O. B. Chicago. Our parts and tubes are warranted to be 100% replacements for the prototypes in the listings above. Prices are subject to revision without notice. SATISFACTION GUARANTEED. Illinois residents add 2% sales tax. ORDER TODAY!

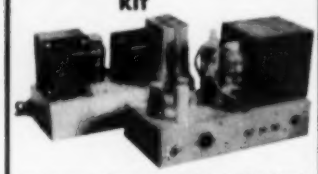
Premier RADIO TUBE CO.

551 W. Randolph St.
Chicago 6, Illinois
ANdover 3-1590

HARVEY

is First with the Finest at Most Reasonable Prices!

WILLIAMSON HR-15 AMPLIFIER KIT



The famous Williamson HR-15 amplifier circuit . . . now available with the original Partridge transformers built to Williamson's specifications. Build this kit in 3 hours or less, and enjoy sound of a quality you never heard before. The HR-15 is a 2-Chassis power amplifier for use with tuners or other front ends having own volume and tone controls. All American triodes, 2-6SN7GT, 2-807 or 6BQ6G in PP output, 5V4G rectifier. Response ± .5 db, 10-100,000 cycles. Output impedances 1.7 to 109 ohms in 8 steps. Absolute gain 70.8 db. 20 db. of feedback around 4 stages and the output transformers. Kit is Complete with Tubes, Punched Chassis, Pre-wired Resistor Board, Sockets, Genuine Partridge Output Transformer, and All Necessary Parts.....$78.50

As Above, with CFB Transformer.....$90.00
PARTRIDGE Output Transformers available separately WWFB, as used in above kit.$26.50
CFB Transformer, Hermetically sealed.....$40.00

HR-15T A Williamson Kit with all TRIAD TRANSFORMERS . . . including power transformer, chokes and specially designed output transformer which is completely sealed in tar. ± 2 db. 10-100,000 cps. Harmonic Distortion less than .1% — 10 watts output. Output impedances 4-8-16 ohms.....$69.50
Both HR-15 and HR-15T Kits available with KT-66 tubes for $3.00 extra.

★ ★ ★ ★ ★ ★

NEW SONAR MOBILE RECEIVER
Model MR-3
NEW
SONAR MOBILE Rcvr. Model MR-3

Complete coverage for 10-11-20-75 meters. 8 tubes, 4.5 watts audio output. Uses: 12AT7 RF stage and B.F.O., 6U8 oscillator mixer, (2) 6CB6 I.F. stages, 6AL5 2nd detector and noise limiter, 6AT6 1st audio, 6AQ5 audio output, OB2 voltage regulator. 1 Microvolt signal produces 0.5 Watt audio output. A.N.L. and B.F.O. are push-button operated. Requires 250 Volts at 60 to 80 mils. Size: 4-9/16" x 5-3/16" x 5-11/16". Complete with tubes . . . less power supply and speaker....$89.95

★ ★ ★ ★ ★ ★

ELMAC A54
Under-dash Mobile Xmtr.



For Carbon Mike Input ..... Net $139.00
For Dynamic or Crystal Mike ..... Net 149.00
Power Supply, 110 volts AC ..... Net 39.50

NOTE: In view of the rapidly changing market conditions, all prices shown are subject to change without notice and are net, F.O.B., N.Y.C.

Telephone hrc LExington 2-1500

HARVEY RADIO COMPANY, INC.
103 West 43rd St., New York 18, N. Y.

process applications until July 1. This is to allow time for the filing of new applications and the refiling of pending applications on newly devised forms. This process will have the effect of putting all competing applicants, new and old, on the same footing when their bids are considered. The Commission emphasized that when it starts processing the applications on July 1, it is going to give first attention to those areas without any present TV service, and to those communities that will be strictly on u.h.f.

The big question mark now, of course, is how many stations will be built and put on the air during 1952 and where will they be located?

Some indication of the number of stations that may go on the air during 1952-53 may be gained from a review of the information contained in a report issued recently by the RTMA about the findings of its "task force" committee which has been studying the effect of the lifting of the station construction freeze on the national defense program.

Material requirements for transmitters, studio equipment, and antennas through the middle of 1953 can be met from manufacturers' inventories and current allocations of materials without asking for increased allocations. The report indicates there are 28 TV transmitters already delivered to prospective broadcasters, 20 in manufacturers' stock, and 154 in process, for which materials are assured.

The committee reported that on a "realistic schedule" construction permits for 140 new television stations would be issued by the Federal Communications Commission by the end of 1952 and 190 more by the end of 1953. It was estimated that half of these would be for u.h.f. transmitters, and the remainder for v.h.f.

The prediction was made that 22 new v.h.f. stations, but no u.h.f. stations would go on the air during 1952, 21 of them in cities not now served with television. During 1953, according to the committee, 171 new stations would go on the air with 64 in the ultra-high-frequency range.

Using both "optimistic and pessimistic" projections, the committee estimated that consumer demand for television receivers would be increased between 750,000 and 1,660,000 sets in the second half of 1952 and the first half of 1953 by the lifting of the "freeze."

According to the report of the RTMA "task force" committee, 48 finished television transmitters are available for immediate installation—28 already delivered to prospective telecasters and 20 in manufacturers' stock. Of these 48 available transmitters, they expect 22 to be on the air by the end of 1952. Twenty-one of these transmitters will be operating in cities not now served by television. Since these are all v.h.f. transmitters this means that 21 new areas of opportunity for television servicing businesses will open up during the latter half of 1952 with the initial requirements for installations to receive a channel in the present range. But, since there probably will be u.h.f. channels assigned to these new video areas, prospective set purchasers will have to be convinced that their new receivers will bring in u.h.f. programs when they are available.

New Service Business Opportunities

It is the considered opinion of the editors of this department that the renewal of television station construction with the addition of 70 channels in the ultra-high-frequency region of the spectrum will mark the beginning of a new era in radio-television service as a business activity. It has been proved that good, reliable service is the very keystone of good television reception. Television set owners have demonstrated that they do not want cheap service—they want dependable, reliable service. They will willingly pay the price for this good service if they know what they are buying and can be shown that it is worth what they are paying for it.

Hundreds of independent television servicing contractors and many receiver retailers have proved through the success of their own businesses that reliable, competent television service can be given to set owners. They have also shown through the success of their own businesses that this kind of service can be given at a profit. But in all cases, these successful service businesses have been managed as *businesses* and not as *technical laboratories.*

Consumer television service in these new areas will be greatly benefited by the experience of seasoned, successful service businesses in present telecasting areas. Some radio service operators in these new video regions will be able to expand their businesses to become successful television installation and service contractors. But the majority of one-man radio service shops will find the television service business very complex and very confusing. Radio technicians in these new TV areas will do well to carefully study the six basic features of television service as a business as they were outlined for members of the Philadelphia TV Contractors Association by Paul V. Forte, their executive secretary:

1. "Television, consisting of an integrated group of complex electronic circuits, requires considerably more test equipment than radio. Such equipment is costly and far beyond the financial resources of the old-time radio mechanic. In addition, it is delicate, sensitive and in some instances, bulky—it can't be trundled from home to home on service calls. It must be intelligently installed on a bench in a shop where it can be effectively used. That means you have to have a *service shop.*

2. "In order to handle service calls on television you have to have a panel

truck or specially fitted car. In it must be carried a supply of tools, equipment, and spare parts that are in most common need. When a TV set can't be repaired with these facilities, the car or truck must be suited so that a chassis and/or cabinet can be brought back to the shop for bench work. Such vehicles cost money and represent another investment on the part of the service contractor.

3. "Since there are, roughly, about eighty different makes of television receivers and thousands of models, the effectively-operating contractor must have a complete library of diagrams, schematics, and service notes. These things cost money, and taking care of them, adding to them, and using them costs time and money. Without them no man can claim that he is ready to service television.

4. "A service operator cannot function properly unless he has records of all service calls. These are not things he keeps in his mind or in his wallet. He's got to have files and forms and he's got to have somebody work on them to keep them up to date. That means he has to have an office and someone in it to handle service requests and to dispatch them properly, and promptly. These things cost money, a cost that cannot be borne by one man working alone.

5. "He must have special equipment and facilities for installations which include the erection of antennas. This, definitely, requires a truck. Yes, he can contract the antenna installation to someone else but that is hardly a good way of conducting a business. Trucks, too, cost money and are an integral part of the investment that must be put into a television service operation, as well as into the cost of service.

6. "Since he is dealing with expensive equipment in the customer's home, he has to carry Public Liability and Property Damage insurance. He has to carry other insurance on his vehicles, test equipment, parts stock, and other facilities. It costs more money!"

Since most television contracts, installation, and service work originate with the dealer who sells the receiver, the set dealer's requirements are usually the governing factor in what service company gets the business for his customers. Where antenna installations are involved, the average dealer will give his business to the service contractor who has complete facilities for installation and service. It is doubtful whether these new TV areas will witness the frenzied boom in receiver sales that marked the early days of TV in major centers, when television installation and service contracts were dished out to service operators without any regard to their ability to fulfill the long term contract commitments for service.

Future of Radio Service

A recent report from RTMA revealed some interesting statistics on

ARROW HAS MOVED!→

ARROW SALES, INC., formerly of 1712 S. Michigan Ave., Chicago, wishes to announce its new location in North Hollywood, California, Telephone: SUnset 3-7319 . . . to continue to serve you with fine merchandise at the right prices.

MN26C BENDIX RADIO COMPASS

. . . complete with tubes, MN28C control box, loop transmission cable, MN20E loop, flexible cables, plugs, etc..... **$89.95**

SCR 625 Famous Mine Detector
For Prospectors, Miners, Oil Companies, Plumbers, etc.

This unit is being offered now at a considerable reduction in price. Recently advertised at $79.50 it is now available in the same brand new wrappings in suitcase style carrying case (less batteries) at

$59.50 WHILE THEY LAST!

COMMAND (SCR-274N) EQUIPMENT

	used	new
BC-442 Antenna Relay, complete		$ 3.95
BC-451 Transmitter Control Box		1.50
BC-450 3 receiver remote control box		2.95
MC-215 Mechanical Drive Shaft, per length		2.95
BC-406 2 position Rec. Control Box		2.95
T-23 ARC5, 100-156 mc xmtr		49.50
BC-459, less tubes	12.95	
BC-458, less tubes, crystal	5.25	
BC-455, 6-9 mc receiver, with tubes	9.95	14.95
less tubes	7.95	
BC-453, with tubes	19.95	
less tubes	14.95	

FLAP PITCH MOTOR

24 VDC, will operate on AC-3300 or 11,000 R.P.M. Complete with gear box and limit switches, excellent, used **$4.95** each

MONTHLY SPECIAL

BC457 command transmitter covering 4-5.3 mc, shipment just received, limited quantity, less tubes and crystals, exc. cond..... **$5.25**

PHONE EQUIPMENT

H8-23 High Impedance Headset	new	$4.95
H8-33 Low Impedance Headset		5.95
CD-307 Ext. cord for H8-23-33, like new		.95
Throat Mike—T-30—new		.98
Lip Mike—Navy Type—new		.98
Extension Cord and switch assembly for lip and throat mikes, new		.98
R8-38 Microphone, new		4.95
H8-38, new		2.29

We have a very complete list of all types of tubes . . . write today . . . please specify quantity desired.

Look at these items—write for best prices!

ARN7 AUTOMATIC DIRECTION FINDER . . . complete installation
SCR269F AUTOMATIC DIRECTION FINDER . . . comp. inst.
SCR269G AUTOMATIC DIRECTION FINDER . . . comp. inst.
SCR522 VHF transmitter and receiver, available as a complete installation or just transceiver
BC733D LOCALIZER RECEIVER, complete with tubes and crystals
DM53A DYNAMOTOR for above
FT292 MOUNT for 733
RC732 CONTROL BOX for 733
PLUG8 for 733
R89/ARN5 GLIDE PATH RECEIVER
R57 GLIDE PATH RECEIVER
AN/APS4 Complete RADAR SET
BC638A Frequency METER
BC376H Test OSCILLATOR
ID6/APN4 Loran INDICATOR
R9/APN4 Loran RECEIVER POWER SUPPLY
IE36 TEST SET for SCR 522
I 139 Meter p/o IE36, available separately
MD4/APS2 Modulator Unit
T810A/APN Altimeter TEST UNIT
T816/APN Altimeter TEST UNIT
T851/APG4 TEST SET for bomb release equipment
T8176/ARN5 Glide Path TEST SET
T8184/AP Signal GENERATOR
T8251 Loran TEST SET
RT34/APS13 420mc Tail-warning TRANSCEIVER
BC788 TRANSCEIVER
BC1023 Marker Beacon RECEIVER
BC1033 Marker Beacon RECEIVER
BC1206 Beacon RECEIVER
TP810 Receiver

All shipments F.O.B. warehouse . . . California residents add sales tax with your remittance. 20% deposit on all orders. $5.00—minimum order accepted.

ARROW SALES, INC. 7460 N. Varna, North Hollywood, California, SUnset 3-7319



NOW THERE ARE **2 GRAYBURNE Loopsticks!**

FERRI-LOOPSTICK and VARI-LOOPSTICK

Grayburne Loopsticks, with magic Ferrite cores, obsolete conventional radio loops, improve reception amazingly over entire broadcast band, and pull in hard-to-get stations that normally can't be heard with ordinary loops.

Highest Sensitivity: Average Q is 250, unaffected by adjacent metallic or inductive elements.

Omni-Directional: Equally sensitive and efficient at every angle. No more turning or moving receivers to get better reception.

Greater Receiving Range: Greater, more uniform amplification over a wider frequency range—all at higher signal-to-noise ratio.

Performance-Proved: After comparative tests, service dealers coast to coast have bought 100,000 Loopsticks in only 5 months!

FERRI-LOOPSTICK: Just set and forget! For permanent installations, new or replacement, where user desires to make no further changes once Loopstick has been set for maximum overall efficiency. **List 75¢.**

VARI-LOOPSTICK: Has advantages of Micrometer Adjustment and one-hole Snap-in Mount! For peaking efficiency on several stations consecutively, station jumpers and DX tuners. Peak resonance for any station is quickly obtained. **List $1.00.**

Write for name of your nearest Grayburne distributor and free booklet "Ferrites and Their Applications."

GRAYBURNE

Grayburne means Quality Electronic Components

GRAYBURNE CORPORATION, 103 Lafayette St., New York 13, N. Y.

QUALITY TV & RADIO TUBES AT TERRIFIC SAVINGS!

1B3—	$ .70	5U4—	$ .40	6V6—	$ .55
1L4—	.55	6J6—	.68	6W4—	.54
1R5—	.55	6CB6—	.58	6X4—	.35
1S5—	.55	6BA6—	.53	12AT6—	.45
1T4—	.55	6BA7—	.75	12AT7—	.75
1U4—	.55	6BE6—	.50	12AU6—	.75
1U5—	.50	6BG6—	1.00	12AU7—	.65
3Q4—	.68	6BH6—	.60	12AX7—	.65
3S4—	.68	6BQ6—	.95	12BA6—	.60
3V4—	.68	6CD6—	1.35	12BE6—	.55
6AK5—	1.00	6C4—	.50	19BG6—	1.25
6AL5—	.50	6S4—	.60	19T8—	.79
6AQ5—	.60	6SD7—	.88	25BQ6—	.95
6AT6—	.49	6SK7—	.55	25L6—	.58
6AU6—	.58	6SN7—	.68	25C5—	.58
6AV6—	.48	6T8—	.88	50C5—	.58
11723—	$ .48	50B5—	$ .61		

Minimum Order $5.00—Sorry, No. C.O.D.'s

ALLO ELECTRONICS
693 SPRINGFIELD AVENUE
NEWARK, NEW JERSEY



THE J. W. M. TELEVISION and POLICE TOWER

is manufactured from 1 inch Steel Tubing electric welded into 10 ft. sections which are bolted together, when erected making it a tower of strength, and is so constructed that it can be used for a ladder when ascending the tower for erection and aerial repair.

All sections are dip painted which makes possible the painting inside and outside of all parts of each section thus reducing the danger of rust to a minimum.

HEIGHT OF TOWER	RETAIL
20 ft. tower	$ 36.40
30 " "	54.10
40 " "	71.80
50 " "	89.50
60 " "	107.20
70 " "	124.90
80 " "	142.60
90 " "	160.30
100 " "	178.00
110 " "	195.70
120 " "	213.40

Write for Descriptive Literature

MANUFACTURED BY
Jeromesville Welding&Machine
JEROMESVILLE, OHIO

radio receiver production. The report showed that the production of home sets has dropped consistently since 1947, with the exception of 1950, as a per-cent of the total radio output. In 1947, 14,082,662 home radio units were manufactured, accounting for 70 per-cent of total production, while in 1951 only 6,751,452 units were produced or 53 per-cent of the output.

An interesting feature of this report is in the growth of automobile set production from 3,459,061 in 1947 to 4,542,920 in 1951. Auto set production rose from 17 per-cent of the total radio output in 1947 to 36 per-cent in 1951.

The effects of the constantly dropping production of home radio receivers on the future of radio servicing may be interpreted in two ways. It definitely indicates a sagging interest in radio for home entertainment. No doubt the AM radios are still used in most TV homes but since the entertainment interest is primarily centered in television there is a tendency to hang onto the old radio receivers and not trade them in on new models. This situation would indicate a larger market for service on AM radios as age and use take their toll in tubes and component parts.

On the other hand, if the dropping interest in home radios means that AM radio listening has been practically abandoned in a large percentage of TV homes, then the market for service on conventional radios is gradually drying up. This would presage a rather dismal future for businesses that specialize in home radio service.

Association Developments

Last January, when the city fathers of Sheboygan, Wis., were contemplating a city ordinance and licensing bill to control the television service business in that city, Bob Mullen, the only NARDA member in Sheboygan, appealed to the Association's Chicago headquarters to have them present the CTIS (Certified Television Installation and Service) program to the council to avert the passage of the bill.

A group of Sheboygan dealers joined forces to adopt the CTIS program and to prepare a cooperative advertising program to bring the merits of the program to the attention of the public.

Two weeks later their newspapers carried an ad reading: "Look, Mr. and Mrs. Sheboygan, Can You Afford an Accident? Remember, when you hire a sideline operator to erect your TV antenna, he may not be carrying adequate protection for you. *You are the employer* when you hire someone to work on your premises, and if injuries or loss of life result, *you are liable!* . . . CTIS dealers carry the insurance necessary to protect you as a customer. For your protection, insist on Certified Television Installation and Service."

Included in the same ad—indicating a major victory—this appeared: "In cooperation with the City Inspection Department and City Electrical Department."

Now the Sheboygan dealers plan to

extend CTIS throughout their county to clean up and/or avoid any undesirable TV practices.

New Middlesex County, New Jersey, Association

The Television Technicians Association of Middlesex County, New Jersey, is looking for an alignment with a State or National Association of technicians. This recently organized group is composed of 75 members all of whom are actively engaged in television service. Contacts with other organizations are being handled by Ray Viglioni of *Ray's Television*, 276 Washington Street, Perth Amboy, N. J.

Hawaiian Group to Form Association

Radio technicians in the Honolulu area are forming a service association and want information from other associations about activity programs that will be useful in their organization. E. A. Piety of *Puuloa Sales and Service*, whose address is CHA 3, Honolulu 18, T. H., is contacting associations for information.

New Pittsburgh, Pa., TV Service Association

The Television Service Association (Tri State Area) was recently organized in Pittsburgh, Pa., with Robert Laneve of *Pittsburgh Radio, Sound and Television Labs* as its first president. Other officers elected to serve with Mr. Laneve are: Milton J. Reich of *Allegheny Television, Inc.*, as vice-president; Thomas Ulrich of *Penn Television*, as secretary; and L. C. Reed of *Moree Television Service* as treasurer. Penny Martin, public relations counsellor, was selected for the post of executive secretary.

The first edition of the TSA's monthly Newsletter is one of the most effective association bulletins that has come to the attention of the editors of this department.

The association's address is: Penny Martin, Executive Secretary, Television Service Association, 414 Bessemer Building, 104 Sixth Avenue, Pittsburgh, Pa. -30-

HAM CONVENTION

THE twenty-second annual ARRL West Gulf Division Convention, sponsored by the Gulf Radio Club, will be held at the Robert Driscoll Hotel in Corpus Christi, Texas, on June 28th and 29th.

There will be a pre-convention get-together on Friday evening at the K.C. Hall for those who arrive early.

The committee has planned an interesting program which includes talks, contests, special group meetings, a dance, and a banquet.

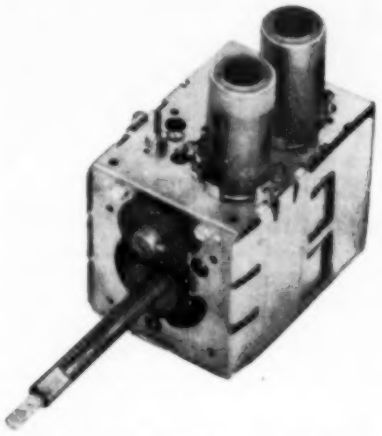
FCC ham examinations will be given on Saturday morning for those who wish to get started with a new license or advance to a higher grade.

Special activities, including a style show, a tea, and a boat ride, have been planned for the XYL's.

Registration for the convention is $8.00 per person. Pre-registration and requests for reservations should be sent to the Gulf Radio Club, P.O. Box 2073, Corpus Christi, Texas.

-30-

TARZIAN TUNER, Model TT-7



The Model TT-7 features 12 VHF channels plus 1 or 2 UHF inputs with appropriate UHF power switching built in. Available for 41 mc. IF systems. (Can be supplied for 21 mc. IF systems.)

SPECIFICATIONS:

RF AMPLIFIER:	6BQ7
OSC. MIXER:	6X8
POWER SUPPLY:	135 volts at 10 ma. 250 volts at 14 ma. 6.3 volts at 0.85 amps.
GAIN:	Into a 5 mc. 6 db △ f IF grid— High channels 23 db min. Low channels 26 db min.
NOISE FACTOR:	As measured into a 3.0 to 3.5 mc. △ f IF— 9.5 db max. for high channels 8.0 db max. for low channels
IMAGE REJECTION:	40 db min. high channels 46 db min. low channels
IF REJECTION:	50 db min.*
RF BALANCE:	20 db min.
VERNIER RANGE:	Plus or minus 1 mc. min. Plus or minus 2 mc. max.

* Except channels 2-3 and 4 of 41 mc. tuners.

* In the UHF position, the tuner is changed to an amplifier for the UHF I.F. Power is applied to the UHF tuner which may be either a FULL-RANGE CONTINUOUS TUNER or a single channel UHF tuner. In either case, a separate UHF antenna input is provided.

SARKES TARZIAN, Inc.

Tuner Division

Bloomington, Indiana

COMPLETE TRAINING

FOR BETTER RADIO-TV SERVICE JOBS



ONLY $12 for the complete 2-volume course

3 MONTHS TO PAY

Let these two great new Ghirardi training books teach you to handle **all** types of AM, FM and TV service jobs by approved **professional** methods—and watch your efficiency and earnings soar!

Completely modern, profusely illustrated and written so you can easily understand every word, these books pave the way to fast, accurate service on any type of home radio-TV electronic equipment ever made. Each book is brand new. Each contains the latest data on the latest methods and equipment—NOT a re-hash of old, out of date material. Each is co-authored by A. A. Ghirardi whose famous RADIO PHYSICS COURSE and MODERN RADIO SERVICE were, for 20 years, more widely used for military, school and home study training than any other books of their type!

THE NEW Ghirardi RADIO-TV SERVICE LIBRARY

Almost 1500 pages and over 800 clear illustrations show step by step how to handle every phase of modern trouble-shooting and servicing.

1—Radio and Television Receiver TROUBLESHOOTING AND REPAIR

A complete guide to profitable professional methods. For the novice, it is a comprehensive training course. For the experienced serviceman, it is a quick way to "brush up" on specific jobs, to develop improved techniques or to find fast answers to puzzling service problems. Includes invaluable "step-by-step" service charts. 826 pages, 417 illus., price $6.75 separately.

2—Radio and Television Receiver CIRCUITRY AND OPERATION

This 669 page volume is the ideal guide for servicemen who realize it pays to know what really makes modern radio-TV receivers "tick" and why. Gives a complete understanding of basic circuits and circuit variations; how to recognize them at a glance; how to eliminate guesswork and useless testing in servicing them. 417 illus. Price separately $6.

If broken into lesson form and sent to you as a "course," you'd regard these two great books as a bargain at $50 or more! Together, they form a complete modern servicing library to help you work faster, more efficiently and more profitably. Completely indexed so you can look up needed facts in a jiffy.

Under this new offer, you save 75c on the price of the two books—and have the privilege of paying in easy installments **while you use them!** No lessons to wait for. You learn fast—and you learn right!

New low price . . . . easy terms
10-DAY EXAMINATION PRIVILEGE

Dept. GH-6D, Rinehart Books, Inc., Technical Division, 232 Madison Ave., New York 16, N. Y.

Send me GHIRARDI'S NEW 2-VOL. SERVICE LIBRARY. I enclose $3 as my first installment and will send you $3 a month for three months until the total price of only $12.00, plus a few cents postage, is paid. It is understood I may read the books for 10 days. Then, if not satisfactory, I will return them and have paid and you agree to refund my $3 and cancel the remaining installments. Books shipped postpaid for full remittance with order—same return privilege.

Name

Address

City, Zone, State

Employer's Name & Address

OUTSIDE U.S.A.—$13.00 cash only. Same 10-day return privilege with money refunded.

defective. They may perform satisfactorily in another receiver of the same model. Other remedies include adjusting the drive control (an eighth to a quarter of a turn of the drive control may eliminate Barkhausen interference effects in the picture), horizontal width, or horizontal linearity. When substituting pulse amplifier tubes, the drive control should be readjusted after each substitution. When the methods previously described fail to eliminate this interference, an ion trap magnet may be placed over the top of the 6BG6 tube and rotated for satisfactory results. If all methods fail, then an anti-Barkhausen 6BG6 tube should be obtained. Anti-Barkhausen 6BG6 tubes are produced by various tube manufacturers and are currently available.

Fig. 6 represents improper distribution of the picture in the horizontal direction. This condition is generally due to improper adjustment of the horizontal linearity control. The proper adjustment procedure for correctly setting the linearity control is to first adjust the drive control properly and then set the horizontal size control until the picture fills the screen horizontally. Adjust the horizontal linearity control until the best possible horizontal distribution is obtained. If reasonable linearity is not obtained, readjust the drive and linearity controls for the best compromise.

If the linearity control does not respond to adjustment or has very little effect, check the damper and pulse amplifier tubes, the linearity coil itself, the condenser in parallel (C_{36}) and the boost or boot-strap electrolytic (C_{38} in Fig. 8). This condition may also be due to magnetic influences either compressing or pulling the sides of the picture. Check for foreign material such as iron hardware on the ion trap or on the focus magnet.

The most common cause for drive bars appearing as shown in Fig. 9 is the misadjustment of the horizontal drive control. The drive control varies the amount of drive voltage to the grid of the pulse amplifier tube and is therefore a critical adjustment. An incorrect adjustment may damage the pulse amplifier tube and/or the horizontal output and high voltage transformer. The drive control should be adjusted in the following manner: adjust size until picture fills the screen horizontally, and the linearity control for the best possible horizontal distribution. Turn drive control until a drive bar or foldover appears in the center or left portion of the picture. Turn the control in the opposite direction until all traces of the drive bar disappear and then turn the control an additional one-eighth or one-quarter turn. This will compensate for various circuit conditions and line voltage fluctuations. An increase in line voltage may produce a slight reappearance of horizontal drive bars. A simple method of checking the drive control adjustment consists of rotating the brightness control from maximum to minimum while observing the face of the picture tube. If the drive control is adjusted properly the drive bar will not reappear.

If the drive control fails to respond to adjustment, check the pulse amplifier tube, the drive control itself (C_{35} in Fig. 8), the condenser in parallel (C_{35}) and other components such as L_{29}, C_{36}, R_{39}, and C_{37}. Also check the oscillator plate load resistor (R_{34} in Fig. 7). Voltage measurements may help to quickly determine the defective component. However, the following simple facts should be kept in mind during voltage measurements. Voltage readings specified by receiver manufacturers are correct only under certain conditions. Such conditions as line voltage, signal and no-signal operation, control settings, and the internal resistance of the voltmeter will affect the readings obtained.

The condition illustrated in Fig. 10 is usually caused by a weak or defective damper tube. Complete failure of the damper tube may result in a loss of the raster. Check the damper tube, boot-strap electrolytic (C_{38} in Fig. 8) for open, and continuity of deflection transformer leads to the terminals and linearity coil. Also check condenser C_{36}.

A loss of the raster or the complaint of no brightness on the face of the picture tube is best analyzed in the following manner: First determine whether the sound is functioning normally. A "no raster-no sound" condition can generally be traced to the low-voltage power supply. If the sound is normal then proceed to check or measure the second anode or high voltage. If the high voltage is normal the trouble is probably due to one of the following defects: ion trap magnet incorrectly positioned, yoke plug not in place or loose, broken or loose CRT socket, defective brightness control circuit, or a defective picture tube. If, however, there is insufficient or no high voltage, check the high voltage rectifier, pulse amplifier, damper and horizontal oscillator tubes. If tube substitutions do not correct the "no raster" condition, measure the drive voltage. This measurement will determine whether the horizontal oscillator is functioning normally. If an incorrect drive voltage reading is obtained, check for defective oscillator components by means of a scope or voltmeter. If a correct reading is obtained check between the grid of the pulse amplifier tube and the output of the high voltage rectifier for defects.

The condition of poor focus as illustrated in Fig. 11 is generally caused by improper adjustment of the focusing control. Similar conditions may be due to a defective high voltage rectifier or pulse amplifier tube, gassy damper tube or picture tube, astigmatic picture tube, partially shorted

high voltage condenser, defective H.V. deflection transformer, leaky drive trimmer, arcing in yoke, open CRT first anode, low "B+", line voltage change or a defective or weak focus magnet. If a magnet is used to provide focusing, a non-magnetic tool should be used for the adjustment (brass or stainless steel). Magnetic material will alter the flux density of the focusing assembly and a correct adjustment cannot be obtained. If the adjustment does not provide proper focusing across the entire picture, substitute focus magnets or deflection yokes or remove the ion trap magnet and replace after an 180 degree rotation. Readjust the focusing control until the best average focus is obtained. If a focus concentration is at the center only, reduce the flux gauss to the tube; if only at the edges, increase the flux for balanced distribution.

Fig. 12 illustrates a miscentered and improperly aligned picture. This is generally due to a misadjusted centering control and a tilted yoke. Loosen the wing nut or yoke supporting brackets and rotate the yoke clockwise or counterclockwise until either the sides of the picture are vertical or the top or bottom is horizontal. Properly recenter the picture and the shadow should disappear. If the shadow remains, check the forward position of the deflection yoke and the ion trap magnet setting. The yoke should be as far forward as the shape of the picture tube will allow. The ion trap magnet should be positioned until maximum illumination and minimum tube shadow are obtained. Many receiver manufacturers supply a limited amount of d.c. current through the horizontal winding of the deflection yoke. This d.c. current compensates for circuit differences and moves the entire picture to the left or right depending on the direction of the current. This arrangement provides proper centering without tube shadow. If tube shadow persists after the above adjustments prove unsuccessful, check the circuit supplying the d.c. current through the yoke. -30-

FCC AMENDS HAM RULES

THE FCC has announced that effective April 1, 1952 Section 12.111 (a) (4) has been amended as follows:

The former frequency band of 14,000 to 14,400 kc. has been reduced by 50 kc. and is now 14,000 to 14,350 kc. The entire new band is open to A1 type emission. A3 emission and narrow band frequency or phase modulation may be used on frequencies from 14,200 to 14,300 kc. by stations licensed to amateurs holding an Amateur Extra Class or Advanced Class license, only when operated and controlled by an operator holding one of these classes of license.

Effective May 1, 1952 the new frequency band from 21,000 to 21,450 kc. will be opened to amateur operation using type A1 emission only. Operation on this band will be open to any amateur holding a valid operator's license, except those of the Novice or Technician Class. -30-

TV DIRECT FROM THIS GREAT FACTORY TO YOU

BRINGS YOU

Finest Quality at Lowest Prices

TRANSVISION

TV KITS, WIRED CHASSIS, and SETS

CABINETS, COMPONENTS, INSTRUMENTS, and ACCESSORIES

SENSATIONAL OFFER

on Top Quality TV Picture Tubes:



• FREE—VALUABLE PREMIUMS:

With every Transvision tube you buy, you get a Merchandise Premium Coupon of real value. Write for list.

• TRADE-IN ALLOWANCE on old tubes:

Make from $2.50 to $5.00 glass allowance on each "dud."

• FULL 2 YR. GUARANTEE:

Only Transvision gives you a Guarantee for 24 months.

COMPARE: Get the full details on the Transvision tube deal today.

FREE BOOKLET: "INSIDE CRT, or What You Should Know About Picture Tubes." Written by CRT experts, illustrated. It will MAKE MONEY FOR YOU. WRITE FOR IT NOW.

TRANSVISION Picture Tube PRICES

Type	Your Cost if no old tube is traded in—DEALER PRICE—	Allowance for old tube	Your FINAL COST, if old tube is turned in.—NET—
10BP4	$17.95	$2.50	$15.45
12LP4	17.95	2.50	15.45
12LP4	19.95	3.00	16.95
14BP4	19.95	3.00	16.95
16BP4	27.95	4.00	23.95
17BP4	25.95	4.00	21.95
19AP4	37.00	5.00	32.00
20CP4	35.95	5.00	30.95

Make Big Money with Transvision's

TESTER-REACTIVATOR

FOR PICTURE TUBES



Tests Picture Tubes and Renews Brightness of Your Dim Picture Tubes. Without removing picture tube from set, measure Cathode emission . . . locate shorts between elements . . . locate high resistance shorts or leakage as high as 3 megohms. Then, REACTIVATE dim picture tubes if there's no mechanical break in tube. 110V-60 cycles; weighs 9 lbs.

$19.95 net

Fully Guaranteed.

FIELD STRENGTH METER

AT NEW LOW PRICE



Improve TV installations; save half the work with the Transvision Field Strength Meter. Especially good for fringe areas—measures field strength as low as 10 microvolts. Model FSM-1, complete with tubes... $59 net

BEAUTIFUL TV CONSOLES



Ideal for Custom-Building or Conversion. Factory prices start from $49. Send for Cabinet Catalog now.

MULTI-SET CONNECTORS

feed up to 5 TV Sets from 1 Antenna

Prices: Multi-Set Conn. for 2 sets.....$4.95 list*

For 3 or 4 sets.....7.95 list*

*Dealers, write for discounts

U. H. F. ADAPTERS

will be available for all Transvision Sets and Kits.

Write for Transvision's Factory Agent Plan and complete literature

FREE: sample copy, subscription info on New Electronics Notes." Request plate and mailing for FREE Monthly issues are gold mines of Products, Sales, service, Construction, etc. WRITE DEPT. RNS TODAY!

EXTRA INCOME EVERY MONTH from hints in "TV and

TRANSVISION, INC. NEW ROCHELLE, N. Y.

DOW SURPLUS

TELECHRON SYNCHRONOUS MOTOR
Type CSW 115V-60 cycle Model N22 W—6—
RPM. Removed from new Surplus $3.95

MISCELLANEOUS ITEMS—ALL NEW
Rubber Grommets—100 asst. $0.80
SP 481 control box with counter ..... 1.45 ea.
Tool: mike and dial ..... .95 ea.
Lenz & Northrop Graph Paper, Type 578, 5 to inch—by—Bound per Ball ..... .90
APC condensers, all sizes ..... .49 ea.
1,000-ft. GWL-19 tw-sted Telephone wire 4.95
50 Watt Tube Sockets—new ..... .95
Antenna Insulators—10 for ..... .65
6 V VIBRAPACK KIT. Vibrator plus non-sync transformer with two outputs—340 v. 140 ma for plates, and 135 v for bias 1.00
BOTH FOR 1.90
FILAMENT TRANSFORMERS. 110V-60 cycle input, output 5V to 13V in 1V steps—output rated 3 amps 1.89
G.E. Solenoids 1.6V DC 25 ohms. Mystery arm, many applications—new ..... .49

GPT TUNING UNITS, A TO F, for ECO, $2.95 ea.

PANEL METERS, NEW STANDARD BRANDS
SPECIAL SCALE
2½ SQUARE CASE

3" METERS

0-150 V AC	$ 3.95
0-15 V AC	3.95
0 to 100 V AC	3.95
0-15 V AC	3.95
0-6 AC VMS	3.95
0-1 V DC	3.95
0-5 V DC	3.95
0-1 Mil DC 6R	3.95
0-100-0-100 DC Mill	3.95
Freq. 120 to 480	
110 V	17.95

3" METERS

0-100 Micro Amp	$ 6.95
0-3 DC Amp	3.95
0-1 DC Amp	3.95
0-1 DC Amp	3.95
0-1 Tuning D.C.	1.98

RHEOSTATS

Watts	Ohm	ea.
25	5	$0.98
25	10	.98
25	15	.98
25	25	.98
25	50	.98
25	100	.98
25	150	.98
25	250	.98
25	500	1.49
25	1000	1.49
100	5	2.95
100	10	2.95
100	25	2.95
100	100	2.95
100	500	4.95
100	1000	4.95

XMIT RF CHOKES
2½y MH— 100 mill 25c
2½y MH— 500 mill 50c
2½y MH—1000 mill 75c

BUY TUBES HERE
SURPLUS

1L6G	9.00	4	$2.00
1P21	1.00	4	1.00
6P4	1.00	4	1.00
6AK5	1.10	4	1.00
6AL5	.70	4	1.00
6SN7GT	.70	4	1.00
6U7G	.90	4	1.00
12-A	Ballast	4	.10
16B	1.40	4	1.00
41	.90	4	1.00
6K7G	.90	4	1.00
6SN7GT	.90	4	1.00
6T6G	.90	4	1.00
6U5	.90	4	1.00
6U7G	.90	4	1.00
6V6GT	.90	4	1.00
6X5GT	.90	4	1.00
6Y6G	.90	4	1.00
6Z4	1.10	4	1.00
6AC7	1.10	4	1.00
6AG5	1.10	4	1.00
6AG7	1.10	4	1.00
6AK5	1.10	4	1.00
6AL5	.70	4	1.00
6AQ5	1.10	4	1.00
6AT6	1.10	4	1.00
6BA6	1.10	4	1.00
6BE6	1.10	4	1.00
6C4	.90	4	1.00
6C6	.90	4	1.00
6CB6	1.10	4	1.00
6D6	.90	4	1.00
6F6G	1.00	4	1.00
6H6	.90	4	1.00
6J5	.90	4	1.00
6J6	1.10	4	1.00
6K6GT	.90	4	1.00
6K7G	.90	4	1.00
6L6G	1.10	4	1.00
6N7G	1.10	4	1.00
6SA7	1.10	4	1.00
6SC7	1.10	4	1.00
6SF5	1.10	4	1.00
6SH7	1.10	4	1.00
6SJ7	1.10	4	1.00
6SK7	1.10	4	1.00
6SL7GT	1.10	4	1.00
6SN7GT	1.10	4	1.00
6V6GT	.90	4	1.00
6X5GT	.90	4	1.00
6Y6G	.90	4	1.00
6Z4	1.10	4	1.00
12A6	1.10	4	1.00
12AT6	1.10	4	1.00
12AU6	1.10	4	1.00
12BA6	1.10	4	1.00
12BE6	1.10	4	1.00
12C8	1.10	4	1.00
12SA7	1.10	4	1.00
12SC7	1.10	4	1.00
12SF5	1.10	4	1.00
12SH7	1.10	4	1.00
12SJ7	1.10	4	1.00
12SK7	1.10	4	1.00
12SL7GT	1.10	4	1.00
12SN7GT	1.10	4	1.00
12V6GT	.90	4	1.00
12X5GT	.90	4	1.00
12Y6G	.90	4	1.00
12Z4	1.10	4	1.00
25A6	1.10	4	1.00
25L6GT	1.10	4	1.00
25Z5	1.10	4	1.00
25Z6GT	1.10	4	1.00
35A5	1.10	4	1.00
35L6GT	1.10	4	1.00
35W4	.90	4	1.00
35Z5GT	1.10	4	1.00
50A5	1.10	4	1.00
50L6GT	1.10	4	1.00
807	1.10	4	1.00
954	.90	4	1.00
955	.90	4	1.00
956	.90	4	1.00
1625	1.10	4	1.00
1626	1.10	4	1.00
1629	1.10	4	1.00
1630	1.10	4	1.00
1631	1.10	4	1.00
1632	1.10	4	1.00
1633	1.10	4	1.00
1634	1.10	4	1.00
1635	1.10	4	1.00
1636	1.10	4	1.00
1637	1.10	4	1.00
1638	1.10	4	1.00
1639	1.10	4	1.00
1640	1.10	4	1.00
1641	1.10	4	1.00
1642	1.10	4	1.00
1643	1.10	4	1.00
1644	1.10	4	1.00
1645	1.10	4	1.00
1646	1.10	4	1.00
1647	1.10	4	1.00
1648	1.10	4	1.00
1649	1.10	4	1.00
1650	1.10	4	1.00
1651	1.10	4	1.00
1652	1.10	4	1.00

OIL CONDENSERS
SPRAGUE #4884

32 mfds. Four 8 mfd. sections in one can 600V	
—oil—perfect for amplifiers	
Here	$4.00
2 mfd 600V Round	.79
2X1 mfd 600V Round	.89
10 mfd 600V	$3.98
5 mfd 5000V—oil	5.00
1 mfd 5000V	6.98
2 mfd 4000V —oil	
6E23F47 Prym—	
oil	6.98
90 mfds. 120V — AC	
6E23F585 Prym—	
oil	6.98

NEON INDICATORS

NE 2	10c ea.
NE 45	37c ea.
NE 30	37c ea.

FUSES

Amp.	Type	Each	10 for	100 for
1	3AG	90.01	$0.20	$2.00
1	3AG	.01	.25	2.00
1	3AG	.01	.25	2.00
1	3AG	.01	.25

—or so it seems—keeps me standing around for an hour or so while he putters around doing a lot of things that could just as well be done later. If he would just take five minutes to give me his order, I could be out of his way and on the road; but instead of doing that, he makes phone calls, works on sets, and so on while I stand around chewing my pencil."

"How about the guy who returns about five times as many 'faulty' parts as anyone else?" Dick wanted to know. "Some of these birds even insist on returning tubes with burned out filaments. Art and I both want to have parts returned when there is really something wrong with them; but it begins to look like a racket when one or two technicians seem to get about eighty per-cent of these bad parts."

"Yeah, and he's got a twin who orders the wrong parts and then tries to blame this mistake on the salesman," Art said. "Another cute little trick of his is to order new equipment, which he does not have the remotest idea of buying, just to see what it looks like; then he refuses to take it. The same lazy bird will not make the simplest of repairs on an item, say a booster, that is still in guarantee, but insists on returning it to the manufacturer. We'd be more than willing to furnish any parts needed rather than go to the trouble and expense of having to box up the booster and return it, and I should think the technician would rather perform the simple operation of replacing a rectifier or adjusting a thermal switch rather than deprive his customer or himself of the use of the booster for a month to six weeks."

"The Chiseler is another salesman's curse," Dick interrupted. "He is the sort who is always saying, 'I'd really like to buy from you, but I can get things so much cheaper from Blank Company that I just can't afford to.' He's always trying to beat down your prices by saying that he can buy it at such-and-such a price from your competitor, but he never comes up with any price sheets or receipted bills to prove what he says."

"Hold it!" Mac broke in. "Your *Cokes* are getting warm while you talk, and so are you. While you two catch up with the rest of us, I'll point out a few things technicians wish salesmen wouldn't do:

"Number One is to carry tales from one shop to another. I like to hear how service business in general is going over the area, but I certainly do not want a salesman coming in here and telling me how many sets one of my competitors is getting back, what a sloppy workman he is, how slow he is about paying his bills, and so on, for this merely convinces me that the salesman will be tattling my affairs at the next shop on his list. By the same token, I don't want to hear him

2 OUTSTANDING DEVELOPMENTS

ROGER-PHILLIPS RESEARCH LABORATORIES RPR

POWERFUL ALL-CHANNEL PERFORMANCE... PLUS HIGH GAIN IN FRINGE AREAS

the sensational new

ROGER-PHILLIPS

Five Element All-Channel

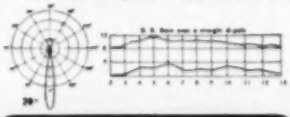
YAGI

This new five-element all-channel Yagi combines all the desirable features demanded of a high performance antenna system.

- All-Channel Coverage
- High Front-to-Back Ratio
- Reduces Co-Channel Interference
- Costs Less Than Double-Stacked Arrays
- Rugged Construction...Easier to Install
- Provides Equal Gain on All Channels
- Perfect Match for 300 Ohm Line
- Pre-Assembled...Lightweight



Model AC-5
(¼ Wave Stacking Bars Built-in...Ready for Use)

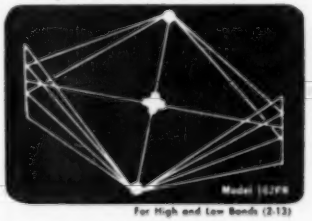


THE RHOMBIC

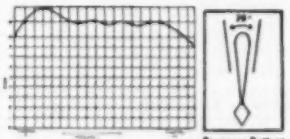
PHILLIPS DX-er

Actually proven in field tests to have higher gain in fringe areas than any other antenna in use today.

- Non-Resonant...14 DB Gain
- Complete Coverage... Channels 2-13
- Reduces or Entirely Eliminates Ghosts
- Sharp Directivity...Lobe Width 20°
- Pre-Assembled...Lightweight
- 12 to 1 Front-to-Back Ratio



Model 162PR
For High and Low Bands (2-13)



Gain vs. Frequency Response

Response Pattern

Write today for complete details and technical literature on these two outstanding antennas.

ROGER-PHILLIPS RESEARCH LABORATORIES RPR

Roger-Phillips
RESEARCH LABORATORIES
717-R NORTH LAKE AVENUE, PASADENA 6, CALIFORNIA

MOVING SALE

In the near future, we will move to our larger, more modern quarters for better serving our many customers. FOR THIS MONTH ONLY. Deduct 10% any purchase in this ad.

G.E. BLANKET CONTROL

Contains a stereo midget 6,000 ohm, relay, trips at less than 2 MA; high impedance choke, bi-metal strip, neon pilot and many useful parts. The sensitive relay alone is worth much more than the total low price of $1.00 each. 10 for $14.50

POWER TRANSFORMER BARGAINS

720 volts CT @ 200 MA, 6.3V @ 10 amps, 5V @ 3A. Potty cased, removed from TV equipment. Guaranteed. each **$3.75**

SCOPE TRANSFORMER BARGAIN

2500 V @ 3 ma, 2 6.3 V @ 2 A, 6.3 V @ 6 amp. Removed from TV equipment. Guaranteed. **$1.89**

SENSITIVE RELAY

D'arsonval moving coil type, mounted in metal case. Adj. 700 microamps to 1 ma. Made by Triplett. ea. **$5.75**

PANEL METERS

NEW GOV'T SURPLUS

*Special Scale

2" METERS

0-100 MA*	$2.49
0-10 MA, AC	2.95
0-4 AMP RF	2.95
3" METERS	
0-2 MA	4.50
0-2.5 AMP RF	4.95
0-500 MA	4.50
0-100 VDC (1 MA)	5.95
0-200 VDC (1 MA)	5.95
0-250 VDC (1 MA)	5.95

FILTER CHOKES

5 Hy 90 MA $5.75
5 Hy 500 MA 4.00

PIGTAIL MICAS

MMF: 5, 20, 50, 60, 100, 250, 300, 400, 500, 750, 800, 1000, 2000, 3000, 4000, 5000, 6000, 10000 ..... $0.09 ea.

OIL CONDENSER SPECIAL

4 mfd 600 vdc oil condenser in cylindrical can (CD YLA 0040 or equivalent). Brand New. Only $1.19 each.

MICROAMMETERS

3" METERS

0-200 UA	5.95
0-500 UA	5.95
4" METERS	
0-200 UA	6.95

GE KV METER

0-10 KV DC, 3½" dia. Bakelite case, 500 UA movement. Includes 30 Meg. 1% Ext. multiplier ..... $12.75 ea.

2" GE Voltmeter

0-30 Volts DC Aircraft type 0-60 ..... $1.99 ea.

OIL CONDENSERS

3.75	mfd	600 vac	$2.49
1.75	mfd	400 vdc	.39
10	mfd	400 vdc	1.95
.068	mfd	600 vdc	1.79
15	mfd	1000 vdc	4.95
1	mfd	1500 vdc	.69
1.5	mfd	1500 vdc	.95
4	mfd	1500 vdc	2.75
1	mfd	2000 vdc	1.50
6	mfd	2000 vdc	3.95
8	mfd	2000 vdc	4.50
3	mfd	2500 vdc	2.25
3	mfd	3600 vdc	1.95
3	mfd	4000 vdc	7.95
3	mfd	5000 vdc	9.95
1	mfd	7500 vdc	1.95
1	mfd	7500 vdc	3.95
.5	mfd	10KV DC	4.95
.02		30,000 vdc	4.95
2	mfd	8 KV DC	12.95
8	mfd	25 KV DC	39.50

OIL CAPACITOR

3x1x1 MFD 1200 VDC SPECIAL ..... 49c ea.

Non-Inductive Resistors

Ohms: 500, 10,500, 100 watts $0.75

INNOVATION IN SOLDERING DEVICES



- BALANCED GRIP with TRIGGER CONTROL.
- DESIGNED FOR EASY SOLDERING.
- SPECIAL ALLOY TIP NEVER NEEDS REPLACEMENT.
- HOT IN 5 SECONDS.
- SLIPS INTO YOUR POCKET OR TOOL KIT.
- WEIGHS ONLY 22 OUNCES.
- TIP LASTS YEARS UNDER NORMAL USAGE.

only **$8.75**

BAKELITE CASED MICAS

MFD	VDC	Price	MFD	VDC	Price
.001	600	$.18	.004	$500	$0.93
.002	600	.24	.033	1500	.75
.01	600	.35	.02	2 KV	.95
.02	600	.35	.002	2500	.45
.01	1 KV	.45	.004	2500	.55
.002	1200	.35	.0001	5 KV	.70

100,000 Ohm wire wound, vitreous enamel resistor. **$0.59** each

WIRE WOUND RESISTORS

5 watt ohms: 25-50-84-200-2500	$0.20 ea.
10 watt ohms: 25-40-1,125-2K-4K	.15 ea.
20 watt ohms: 150-300-750-1K-1.5K, 2.5K,3.7K,10K,20K	.20 ea.
30 watt ohms: 100-2500-5300-10K	.22 ea.

ADJUSTABLE SLIDER RESISTORS

25 Watt:	5, 8 Ohms	90 .25
50 Watt:	100, 150, 200 Ohms	.35
150 Watt:	80, 3700	.65

PEAK ELECTRONICS CO.

188 Washington St., New York 7, N. Y.

Phone COrtlandt 7-6443-4

knocking other salesmen, or the companies they represent. You'd think by now everyone had learned the wisdom of that hoary old adage about not knocking your competition, but some parts salesmen still refuse to practice it.

"Another fellow I can't stand is the one who butts into conversations between me and my customers. Almost as bad is the salesman who hangs around and wants to chat when I'm covered up with work. I'm glad to chew the fat with you fellows when I have the time, for you give me a lot of information about new products that are just out, what items are becoming hard to get, what TV antennas are moving fastest in this area, and so on; but both of you have the good sense to get your order and be on your way when you see I'm really busy.

"Still another salesman who rubs me the wrong way is the one who tries to high-pressure me into stocking up heavily on items I do not want and do not need in large quantities—and no amount of hinting about what large quantities of this item a competitor has ordered will make me change my mind! The same salesman who is so eager to load me up with the stuff he has in over-supply is the one who shows no interest whatsoever in helping me get hold of a badly-needed part that he does not happen to have in stock.

"Finally, it gripes me to have a salesman arrive just as I am going out for lunch or am locking up for the day."

"Well," Dick commented as Mac paused, "all three of us seem to have pretty well got our pet peeves off our respective chests. Now I'm wondering, Mac, if you have any concrete suggestions about what Art and I can do to make things better."

"Suppose first you tell me how life can be beautiful for salesmen," Mac countered.

"That's easy: try to have your orders made up pretty well in advance of our arrival. Order parts by manufacturer and part number, if at all possible; and if you can't do this, give all possible information on model and serial numbers, etc. When we come in, treat us like you would want to be treated. Try to look ahead and give us a little time to supply hard-to-get items instead of waiting until you have to have this article at once."

"And if you are running a small shop, try to place the majority of your orders with two or three concerns instead of half a dozen or so," Art added. "That way your business will be worth-while to the two or three salesmen who call on you, and they will feel like doing their best to keep that business. When your buying is divided into too many parts, none of these parts is worth much effort to the salesmen and, on top of that, you will have that many more salesmen taking up your time."

"And don't make a collector out of the salesman by paying your bill to

OLSON HAS BIG, BIG BARGAINS

5" HI-FI PM SPEAKER



MADE IN FRANCE

1½ lb. Magnet—Stock No. S-168

$1.98 EA.

3 for $5.75

Models, Kits & Components for the entire planet. Worth $10.00 Less.

SEE OLSON'S BIG ADS ON PAGES 86 & 87

OLSON RADIO WAREHOUSE

277 S. Walnut St. Kalon 8, Ohio

POWERFUL RECEPTION ...from Any Direction

JUST FLICK THE SWITCH!

FAMOUS "4-WAY" Wavemaster TV ANTENNA



The Original and the Best!

- NO BOOSTER!
- NO ROTOR!
- NO TURNING!
- ALL CHANNELS!
- NO GHOSTS!

RAY-X CONTROL BOX INCLUDED! Retail $22.95

YOUR COST $11.90 LOTS OF 3 $11.25 EA.

Simply place control box near set. Each of 4 positions opens up one complete antenna in the direction you want, giving reception on all channels.

ORDER NOW! DIRECT FROM MANUFACTURER

RAY MFG. CO. Phone FA 9171

441 Summit St., Toledo, Ohio

Please rush ..... 4-Way (double-stacked) Wavemaster Antenna(s), ready for any mast. Ray-X Control Box included. ☐ Check ☐ Money Order for $ ..... is enclosed. ☐ Send C.O.D. (20% deposit required).

Name .....

Address .....

City ..... Zone ..... State .....

him," Dick said. "Send your check in to the company the first of the month. When a salesman has to do the collecting, it upsets the kind of relationship that ought to exist between the salesman and the shop-owner—especially when the shop-owner gets a little behind on his bills!"

"Don't expect the parts salesman to be a consulting engineer on your tough sets. Most of us do not have much of a technical background, and even if we did we could not roll up our sleeves and wade into the service bench at every shop where we stopped," Art cautioned.

"Fine!" Mac said. "That is exactly the kind of material I wanted. And now both of you can jot down these points in your memory book: I want you to bring me all of the promotional material you receive on new electronic equipment as soon as you receive it. If you want me to fix up my orders correctly, make it easy for me to do this. Those special carbon-backed order blanks Dick leaves with me, and the copy of the latest edition of *'Radio's Master'* that Art's company gave me are examples of what I mean.

"I'll appreciate your tipping me off when you see that a popular item is becoming scarce so that I can order that article somewhat in advance of my immediate needs. I also expect you fellows to help me get hold of an occasional special item that I may need even though you do not stock it at the time. If I take your advice and give all my business to you two fellows, I expect, in return, that you will take care of me when parts are scarce."

"Well," Dick commented as he looked out at the sun that suddenly broke through the clouds and was glistening on the wet streets, "it looks as though the atmosphere has been greatly cleared—both inside and out!"

"And remembering what the good man said about wasting his time," Art added as he slid from the bench, "we'd better be making tracks before he throws us out."

-30-

SELF-OPENING PLIERS

By HUGH LINEBACK

BENDING a short piece of rubber tubing and slipping it over the handles of a pair of pliers gives a spring effect that keeps the jaws open until the handles are squeezed. The tubing also gives a better grip on the handles to prevent slipping.

-30-

Speed service work with this tool tip.



NEW • ADVANCED
SUPERIOR IN PERFORMANCE

THE SCANAFAR



ASTATIC'S NEW TV BOOSTER MODEL CT-1

The Scanafar, new Astatic TV Booster development, incorporates improvements that match the forward strides made in newer model TV Receiver front-ends. It stands alone as a working companion with the new receivers, for added picture brilliance and clarity . . . and offers a still higher measure of reception improvement for older style sets. The Scanafar presents a new minimum noise figure with maximum gain. Band width (over seven megacycles on all channels) and picture definition are excellent. A balanced, cascaded circuit is employed, with a neutralized 6J6 tube driving a 6BQ7 (the highly touted "quiet tube"). **Both tubes are used over the entire TV frequency range.** It all adds up to booster performance that is unparalleled today. Test this new unit yourself . . . at your first opportunity. Be prepared for a new experience in booster aid to TV reception.

EXPORT DEPARTMENT
401 Broadway, New York 13, N. Y.
Cable Address:
ASTATIC, New York

THE Astatic CORPORATION
ASTATIC
CONNEAUT, OHIO
IN CANADA: CANADIAN ASTATIC LTD., TORONTO, ONTARIO

COMPARE PLATT'S VALUES BEFORE BUYING ELSEWHERE!



30 POUNDS OF ASSORTED RADIO PARTS
A TERRIFIC BUY
AT ONLY **$2.79**



Field Telephones
Army surplus, complete with cords, reconditioned and electrically tested. Some 2 flashlight cells and a pair of instruments. Use wires to CHANA-TELEO-like new.
$20.95

FIRE EXTINGUISHER TIRE INFLATOR
Made to load into hydraulic Auto Mfr. Essentially recommended for auto and electrical fire. Guaranteed to not contain defects. Order two—one for your home; one for your car in case of flats or fires.
ONLY **$2.29** each



NEW SUPPLY ARRIVED! LIMITED QUANTITY TRANSMITTER-RECEIVER
Navy Model ABA-1 (CG-43AAG)
Army Model SCR-515A, known as the BC-645
450 MC — 15 Tubes
BRAND NEW—ORIGINAL CARTON
Can be easily converted for phone or CW 2-way communication. Covering for the following bands: 420-450 MC ham band, 450-460 MC for fixed or mobile, 460-470 MC for citizens, 470-500 MC television experimental. Size 10½ x 13½ x 4¾. Contains 15 tubes: 4—7F7, 4—7H7, 2—7R6, 2—6F6, 2—955, 1—WE-316A door knob.
Price includes Dynamotor, Control Box, Mount, Tubes **$42.95**
Complete set of spare parts, tubes and plugs for above **$29.95**

HEADSETS



HS-33 low impedance with cord and plug, used, fine condition $2.79
HS-33 high impedance, BRAND NEW with ear pads 4.89
HS-33 low impedance, BRAND NEW with ear pads, cord and PL-54 plug $4.95
HS-30 with ear plugs, low impedance, used, good condition 1.95
CD-307A Cords, 6 ft. NEW ..... .69
R-10/U high impedance. Includes two receiving units 3.95
HS-16 high impedance—used 2.49



NEW! SHIP-TO-SHORE BC-223 TRANSMITTER
A 30 watt Transmitter, ideal for ship-to-shore or Ham Rig. Crystal or MO control on four pre-selected channels. 2000 to 5250 KC. Use of 3 plug-in coils, five tubes: 2—991 and 3—46, and TI 17-19-25 tuning units.
TRANSMITTER $39.95
TUBES 6.95
TUNING UNITS: TU-17 2000-3000 KC; TU-18 3000-4500 KC; TU-25 5000-5250 KC—NEW IN ORIGINAL CASES 9.90
PE-125 POWER SUPPLY for BC-223—12 or 24V input; output 475V 150 ma.—BRAND NEW 39.95
SPARE VIBRATOR and MOUNT for PE125—NEW 6.95
CABLE between TRANSMITTER and POWER SUPPLY—NEW 3.95



SCR-274N COMMAND and ARC-5 EQUIPMENT

	USED	EXCELLENT USED	NEW
RECEIVERS			
BC 453—190 to 550 KC	$20.95	$29.95	$42.50
BC 454—3 to 6 MC	8.95	9.95	16.95
BC 455—6 to 9 MC	9.95	11.95	16.95
BC 454—500 to 1500 KC (Broadcast Band)		24.95	27.95
TRANSMITTERS			
BC 458—3.3 to 7 MC	7.95	9.95	17.95
ARC5 T-19—3 to 4 MC		24.95	34.95
BC 459—7 to 9.1 MC	13.95	15.95	24.95
ADDITIONAL EQUIPMENT			
BC 456 Modulator	2.49	2.95	5.95
BC 450 Control Box (3 Receiver)	1.49	1.95	2.75
BC 451 Control Box (Transmitter)	1.29	1.79	2.19
BC 442 Relay Unit (ANT)	2.19	2.49	3.69
Plugs PL 147, 148, 151, 152, 153, 154, 156—EACH		1.25	
Flexible Shafting with gear to fit receivers			2.69
3 Receiver Rack	1.79	2.29	2.98
2 Transmitter Rack	1.69	2.19	2.97
Single Transmitter Rack			3.97
DM 32 Dynamotor for Command Set		1.95	5.95
DM 33 Dynamotor for Command Set		2.95	5.95
Shock Mounts for 3 Receiver Rack, 2 Trans. Rack, Modulator or Antenna Relay Unit		1.95	2.45

MINIMUM ORDER $2.00
Immediate Delivery—Send 25% deposit on C.O.D. orders. All shipments F.O.B. N.Y.C. (N.Y.C. residents add sales tax to your remittance.)

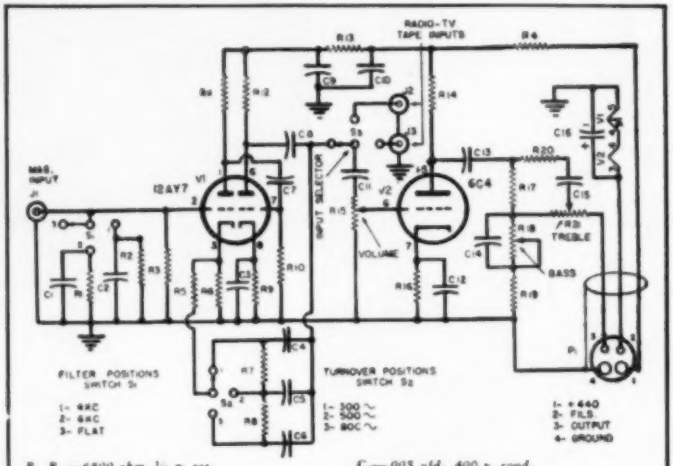
PLATT ELECTRONICS CORP.
Dept. A, 489 Broome St., N. Y. 13, N. Y.
PHONES: WO 4-0827 and WO 4-0828

Front End Control Unit

(Continued from page 41)

used with other output stages provided that their quiescent current drain is at least 115 ma. For drains larger than about 130 ma. it will be necessary to shunt the heaters with a suitable resistor. For amplifiers that do not have the minimum output stage drain, but draw that much total current, the filaments can be wired in the center tap of the power transformer's high voltage winding. This will necessitate a floating ground, but difficulty can be avoided by heavily bypassing the heaters. The filter condensers should be returned to the center tap.

When the unit is placed in operation, the listener will immediately recognize the advantages of d.c. heater operation and use of wirewound resistors by the completely hum-free output and lack of noise. If the magnetic pickup introduces hum, the connections and shielding to the cartridge should be checked for ground loops and improper orientation of the turntable. Be sure that both sides of the a.c. line are bypassed to the amplifier chassis. A mechanical ground system that connects the pickup arm, motor frame, and all amplifier chassis to a water pipe will do much to eliminate any induced hum. Some turntables have proven themselves unfit for high

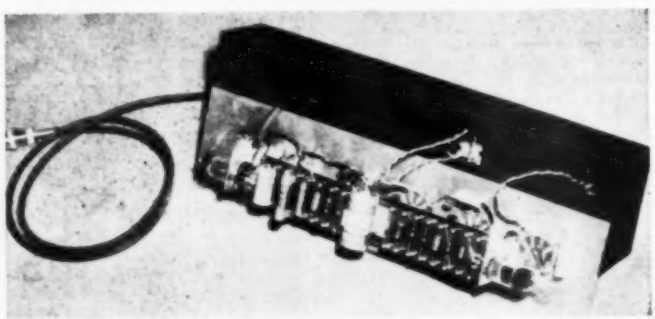


R_1, R_{10}—6800 ohm, ½ w. res.
R_2—4700 ohm, ½ w. res.
R_3—27,000 ohm, ½ w. res.
R_4—47,000 ohm, 2 w. res.
R_5, R_7—100,000 ohm, ½ w. res.
R_6, R_{15}—2200 ohm, ½ w. wirewound res.
R_8, R_9—10 megohm, ½ w. res.
R_{11}—470,000 ohm, ½ w. res.
R_{12}, R_{16}—100,000 ohm, ½ w. wirewound res.
R_{13}—56,000 ohm, 1 w. res.
R_{14}—500,000 ohm linear taper pot.
R_{17}—1 megohm audio taper pot.
R_{18}—10,000 ohm, ½ w. res.
R_{19}—100,000 ohm linear taper pot.

C_1—.005 µfd., 400 v. cond.
C_2—.01 µfd., 400 v. cond.
C_3, C_{12}—25 µfd., 25 v. elec. cond.
C_4—.0035 µfd., 400 v. cond.
C_5—.002 µfd., 400 v. cond.
C_6—.0015 µfd., 400 v. cond.
C_7—.02 µfd., 600 v. cond.
C_8, C_{11}, C_{13}, C_{14}—.05 µfd., 600 v. cond.
C_9, C_{10}—20 µfd., 450 v. elec. cond.
C_{15}—150 µµfd. mica cond.
C_{16}—50 µfd., 50 v. elec. cond.
S_1, S_2, S_3—S.p. 3-pos. shorting-type rotary sw.
J_1, J_2, J_3—RCA-type phono jack
V_1—12AY7 tube
V_2—6C4 tube

Fig. 9. Preamplifier with simplified filter and "boost only" bass and treble controls.

Fig. 10. Preamplifier with simple filter, built according to schematic of Fig. 9. An aluminum sub-assembly forms the basis for the mounting of resistor boards and tubes.



quality work. Even with their motors suspended 10" below the turntable, the magnetic field is still strong enough to cause hum. The solution is to replace the turntable unit with one of better quality.

There is wide latitude for satisfying individual preferences and applying recommended compensation in the finished unit. The turnover selector is set for the particular record in use, then the variable equalizers are adjusted to suit the listener's taste. Usually, the bass and treble will have to be boosted at lower volume levels and run flatter as the loudness increases. The treble control will compensate amply for any pre-emphasized recordings if the de-emphasis circuit is not used. Coincidental use of the scratch filter and the treble control will bring a balance between record noise and highs. The best procedure is to start with the treble flat and adjust the filter to the point where scratch is reduced noticeably. Then by advancing the treble until the scratch is just barely heard, the balance is effected and the maximum permissible amount of highs will be present without the annoyance of record noise. Use the filter with discretion and in the highest possible position.

—30—

U.H.F. Conversion
(Continued from page 58)

the frequency of operation. Consequently, if the signal can be introduced to the first vacuum tube at a low frequency a better ratio can be obtained. Inasmuch as the signal output is so very low at the crystal mixer (and crystal mixing has not added a high noise level), the signal-to-noise ratio of the tuner is set by the first i.f. tube. A satisfactory ratio can be obtained because of the lower applied frequency. If an r.f. amplifier stage or vacuum tube mixer were employed it would be more difficult and more costly to obtain a comparable ratio because of the much higher signal frequency.

To summarize, a higher signal-to-noise ratio per cost factor can be obtained by introducing a lower frequency signal to the first vacuum tube circuit. Thus vacuum tube amplification or mixing in the u.h.f. range is not used. Instead, a low noise crystal mixer is used to reduce the signal frequency before it is introduced to the first vacuum tube circuit at a much lower frequency. To obtain the very best signal-to-noise relation with this system the i.f. stage must be designed with care to keep hum and noise level at a minimum. The new cascode type amplifier with its low noise content and effective shielding will be almost universal in u.h.f. converters.

Local oscillator radiation is not as trying a problem as in the v.h.f. band despite the absence of an r.f. amplifier stage. The crystal mixer in addition to its attenuation characteristic also requires much less local oscillator



THOUSANDS ARE RAPIDLY LEARNING ABOUT ITS OUTSTANDING FEATURES

SUCH AS:

SHARP, CLEAN "SNOW-FREE" PICTURES

And

- Correct impedence for "ghost-free" reception. Nominal 300 ohms.
- Lower in cost than other leadlines purported to accomplish same results.
- Correct spacing for minimum radiation loss. Less than 1% of operating wave length.
- Fully insulated—approved by safety experts.
- Pure, unadulterated polyethylene insulation—specially treated by our chemists for extreme weather.
- High-efficiency conductors: Flexible, stranded—to insure long life.
- Easily installed—with standard insulators.
- Packaged in convenient lengths: 100', 250', 500', 1,000', 2,500'.
- AT YOUR DEALERS, or Write For Free Samples and Literature.

**Patent Pending *Trade Mark U.S. and Foreign Patents Pending*

EXCLUSIVE LICENSEE AND SOLE MANUFACTURER

Don Good, INC. **1014 FAIR OAKS AVENUE SOUTH PASADENA, CALIFORNIA**

OTHER OUTSTANDING GOODLINE PRODUCTS:

VARIABLE TELETRAPS—2: Highly effective for *eliminating interference* from FM STATIONS, and DIATHERMY and AMATEUR SIGNALS within its tuning range.

HI-PASS FILTER: *Eliminates or greatly reduces interference* picked up by I. F. AMPLIFIER or TV RECEIVER—interference arising from strong, local low-frequency fields: X-Ray, Diathermy Equipment, Neon Lights, Etc., Etc.

Available Now . . .

The Revolutionary NEW SONAR SR-9 Receiver and SONAR MB-26 Transmitter

Specially designed for today's needs in

CIVIL DEFENSE

and other medium range radio communications. Not just a monitor, but a compact 9-tube superheterodyne receiver and a comparably efficient transmitter for dependable 2-way operation.

Write for specifications and prices

IMMEDIATE DELIVERY

WANTED

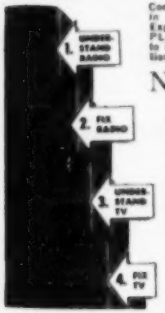
RADCOM pays highest prices for surplus equipment, parts and tubes. We need TCS-7 and up; SCR 274-N; SCR 399 equipment; BC 312, 342 and 348 Receivers; SCR 522 equipment; SCR 211 frequency meters and RA-34 rectifiers.

Bigelow 3-6434 Bigelow 3-6610

Always Right With Earl White

RADCOM Engineering Co. 8 Livingston St. Newark 3, N. J.

NOW! BECOME EXPERT AT RADIO-TELEVISION IN 4 EASY STEPS!



Complete Self-Training Course in RADIO and TV by Famous Experts — Takes You BY SIMPLE STEPS From Basic Theory to Problems of Repair, Installation, Color TV, etc.

NOW you can do ANY Radio-TV installation, service, or repair job like an expert; operate field-testing equipment; understand problems of TV, FM-AM transmission, etc. Step into a good-paying job—or start your own service business. Train yourself AT HOME IN SPARE TIME with the McGraw-Hill Basic Course in Radio and TV.

2296 Pages—1611 Illustrations

The men who wrote this complete 4-volume course are among the outstanding radio and TV instructors in America today. Every detail is clearly explained in over TWO THOUSAND PAGES of step-by-step instruction and over SIXTEEN HUNDRED "how-to-do-it" illustrations, cross-section diagrams, etc. The review questions and answers "nail down" everything you learn. At-a-glance "trouble-shooting" charts show how to diagnose instantly any radio or TV breakdown . . . and how to repair it expertly and quickly.

The course will pay for itself many times over. It can qualify a beginner for FCC's 1st Class License test; gives an experienced technician more confidence and skill.

SEND NO MONEY

Mail coupon below to examine complete four-volume course FREE for 10 days. No obligation. Or you may examine individual books FREE for 10 days by checking the proper boxes in coupon.

PARTIAL CONTENTS ESSENTIALS OF RADIO.
800 pages, 413 illus. Circuit Analysis • Vacuum Tubes • Circuits: Detector • Amplifier • Tube Oscillator • Power Supply • Transmitting, Receiving • Etc.

ELEMENTS OF RADIO SERVICING.
475 pages, 375 illus. Multimeters • AC Power Supply • Speakers • Antennas • Auto Radios • Push-Pull Output Stage.

BASIC TELEVISION.
582 pages, 413 illus. Scanning • Synchronizing • Video Signal • Brightness Control • DC Reinsertion • Picture • FM Alignment • Picture Tubes • VHF and UHF transmission • Reception.

TELEVISION SERVICING.
428 pages, 368 illus. Antennas • Transmission Lines • Test pattern and Picture Analysis • Localizing Reception Troubles • Interference Remedies • Deflection Circuits . . . AND MUCH MORE!

FREE 10-DAY TRIAL COUPON

McGRAW-HILL BOOK CO., Inc., Dept. RTN-6-52
327 West 41st St., New York 18, N. Y.

☐ Send me for 10 day free examination the Basic Course in Radio and TV, 4 Vols. (Regular retail price is $26.00. Special Course Price only $21.95 in easy installments.) If not satisfied with Course, I will return it, pay nothing. Otherwise, I'll send $1.95 plus delivery then and only $4.00 in monthly installments.

If you wish to examine any of these books individually, check below the one you wish us to send you for 10 Days' FREE EXAMINATION:

☐ Essentials of Radio, $6.75
☐ Elements of Radio Servicing, $5.25
☐ Basic Television, $7.50
☐ Television Servicing, $6.50

For any book I keep, I'll send $2.00 plus delivery in 10 days, balance in easy monthly installments.

Name .....
Address .....
City ..... Zone ..... State .....
Position .....
RTN 6-52
Company .....

☐ WE PAY FOR DELIVERY if you send first payment of $1.95 when ordering Course or full price when ordering individual books (prices above). Same return privilege.

excitation than a corresponding vacuum tube mixer. Furthermore there is a greater frequency separation between the signal and local oscillator frequency and the local oscillator component is not as likely to pass out through the frequency selective input circuits to the antenna.

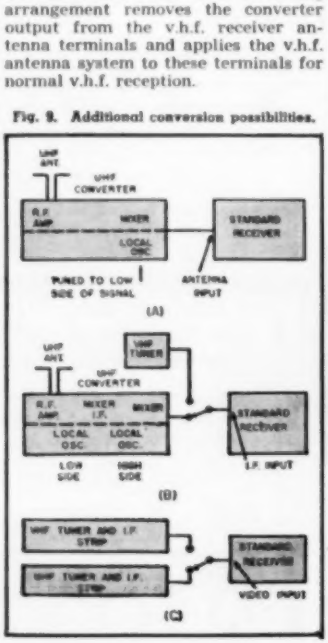
Output and Switching Systems

Output signal frequency of the u.h.f. converter will be in the channel frequency range of the present v.h.f. receiver so the converter is attached to the receiver in much the same way as we attach a booster today. The antenna or antennas are attached to the converter while the output of converter is applied to the antenna input terminals of v.h.f. receiver. The most common output frequency range will be over the Channel 5 and 6 spectrum with Channels 2-3 or Channels 12-13 output ranges a possibility for some few converters.

Two adjacent channels are chosen in order that in a given area converter output frequency can be set to whichever channel of two adjacents is unused. For example in New York with a Channel 5 station in operation, the converter output would be set on Channel 6; in Philadelphia, with a Channel 6 station in operation, the converter output would be set on Channel 5. The receiver is set on this predetermined channel whenever u.h.f. reception is desired.

A switch is included to switch the converter output to the receiver antenna terminals when u.h.f. reception is desired. At the same time, the u.h.f. antenna is attached to the input of the converter. The same switching arrangement removes the converter output from the v.h.f. receiver antenna terminals and applies the v.h.f. antenna system to these terminals for normal v.h.f. reception.

Fig. 9. Additional conversion possibilities.



Columbia
GEM OF THE SURPLUS

S-S-S-S-SIZZLING VALUES SALE!

COLUMBIA MARINER: 100 W. 4-channel, x-tal controlled. FCC approved. 12 or 24 V. input. COMPLETE, READY TO GO $349.50
Unconditional 90-day guarantee.
JOHNSON MARINE TRANSMITTER: 90 W. VERY EASY TO OPERATE. 12, 24, 32, 115 V.D.C. input. COMPLETE, ONLY $299.95
Unconditional 90-day guarantee.
BC-223 TRANSMITTER: 25 W. 4-channel, x-tal controlled, 12 or 24 V. input. Less crystals. A SUPER BUY! $495.00
ARS RADIO COMPASS RECEIVER: 125-9005 kc. MOST COMPLETE MARINE RECEIVER MADE! Checked out with ALL accessories $495.00
DU-1 LOOP for above item. ONLY $37.50
JEFFERSON-TRAVIS 5 W. MARINE RADIO TELEPHONE. 6 V. input. COMPLETE, less crystals. SPECIAL $89.95

THUMBNAIL INFO ON NEW REDUCTIONS!

ARC-4 VHF TRANSCEIVER: For novice, CD or 2-meter. With tubes $32.50
BC-659 10 METER FM MOBILE TRANSCEIVER. Power supply, hand set and antenna. Complete $5.00
DYNAMOTOR: PE-73 24 V. input; 1000 V. @ 350 ma. Used 5.95
DYNAMOTOR: DM-77 24 V. input; 1000 V. @ 175 ma. Used 14.95
SCR-625 MINE DETECTOR: Now $89.50. (In the New) 39.50
HS-30 HEADSET. New 3.95
FILAMENT XFMR: 9-12 V. @ 3 amp. 1.49
CONDENSER: 2 mfd. @ 3000 V. New 1.95
RESISTORS: 100 assorted 1/4, 1/2, and 1 W 2.75
INVERTER: PE-206. Used 9.95
MARKER BEACON RECEIVER: BC-357. Used 9.00
FLEX CABLE: 274-N type. 6 ft. 2.95
FLEX CABLE: ARN-7 type. 6 ft. 3.25
SIGNAL LAMP: Pistol grip. 12 V. sealed beam, converts to 6 V. New 3.50
CARBON MIKE: RS-38 A. Similar to T-17. Used 2.50
THROAT MIKE: T-30-U. New 1.25
BC-451 TRAILING WIRE ANTENNA CONTROL BOX. With rec-counter. New 2.50
VEEDER ROOT COUNTER: Type 5-L. Counts to 9,999. New 1.50

AIRCRAFT EQUIPMENT

ARN7 MN-26 C MCR-260 ARR-5
ARR-7 BN-53 Headset VHF ARC-5 MN24C
FL-6 Filter—New and used. Loop (CAA)
APN-9 ARC-3 APR-4 ARC-3 APR-5
ART-13 RTA-1B SCR-522
NOTE: We stock most complete line of TS gear in West Coast. Write us for prices and types available.

ARC-5 OR 274-N TRANSMITTERS

2-3 mcs. $10.95
4-5.3 mcs. Used, good cond. 6.95
5.3-7 mcs. 8.50
7-9.1 . . . . . 12.50

ARC-5 OR 274-N RECEIVERS

.55-1.5 mcs. Brand new $49.50
1.5-3 mcs. Brand new 34.50
6.0-9.1 mcs. Brand new 19.95

RACK FOR DUAL TRANSMITTER (274-N) 3.95
RACK FOR DUAL TRANSMITTER ARC-5 . . . . . 3.95
TRIPLE RECEIVER RACK 5.00
BC-442-A ANTENNA RELAY with 50 mmfd. condenser. Excel. con. 3.95

SCR-284 TRANSMITTER & RECEIVER: Freq: 3800-5850 kcs. BRAND NEW. Write for information and prices.
APN-1 FM MODULATOR SECTION ONLY: With schematic $6.95

TUBES		TUBES		TUBES	
2AP1	10.95	6J5	$0.75	813	$9.95
5BP4	4.95	6K7	1.10	829B	9.95
		6L6M	2.50	832A	9.95

REMEMBER: We're famous for paying top prices for new or used radio gear. If YOU have anything to sell—write us FIRST!
All orders F.O.B. Los Angeles. 25% deposit required. All items subject to prior sale.

COLUMBIA ELECTRONIC SALES
522 South San Pedro Street
LOS ANGELES 13, CALIFORNIA

RHOMBIC TV ANTENNAS

Power Gains of 100 and More for consistent extreme fringe area reception.
BUILD YOUR OWN—USE OUR RHOMBIC TV ANTENNA BOOK
- Complete Simplified Building instructions and drawings for 24 sizes.
- Use and Design of open wire lines.
- Information on Stacked Rhombics.

$1.50 Postpaid
Richard J. Buchan
WWTH Rochester, Minn.

LEARN TELEVISION
ELECTRONICS and RADIO
Engineering Laboratory and Classroom Training. Day and Evening Classes.
Write for Illustrated Catalog
ELECTRONICS INSTITUTE, Inc.
21 HENRY DETROIT 1, MICH.

Other possibilities for u.h.f. converters, Fig. 9, are to use an r.f. amplifier preceding the crystal or a vacuum tube mixer for more expensive types. Amplification in the u.h.f. range requires more critical design and expensive components and the problem at the moment is to reduce higher costs.

If more sensitivity, selectivity, and image rejection are desired, the second method is preferred. This system, using a double superhet technique, has a first mixer-oscillator that reduces the signal frequency into the 150-250 mc. range. The signal is then amplified in the selective multi-stage i.f. strip before presentation to a second mixer-oscillator. The output of the second mixer has the same frequency range as the low video channels (2-3) or the i.f. range of the v.h.f. receiver. For the latter arrangement, actual v.h.f.-u.h.f. switching would be done at the input of the i.f. strip of the v.h.f. receiver, keeping the v.h.f. and u.h.f. tuners separate from each other. This system might at first appear elaborate but with small component parts the unit can be mounted on a sub-chassis that can be attached to the main chassis of a v.h.f. receiver. A converter of this type was constructed by *RCA* and attached to their "Anniversary" model receivers for field checks.

Still another possibility would be to have a complete u.h.f. tuner and i.f. strip assembly and do the switching at the input to the receiver video amplifier. These latter two systems are likely to be common in factory-built combination v.h.f.-u.h.f. model receivers.

In the final article, we will discuss additional tuners, test equipment needed for u.h.f. work, and proper alignment procedures.

(To be continued)

A new and improved portable field telephone set has been developed by the Bell Telephone Laboratories for the Signal Corps. Basically, the new unit has been modeled after the new Bell System 500-set which has recently gone into production. The field set incorporates a number of special military features. It has a shaved earpiece end so it can fit comfortably beneath a battle helmet and a special "press to talk" switch that can be operated by a soldier wearing Arctic-type mitts.



Yesterday a dream...

today a

REALITY!



— the miracle the electronic world has waited for... here at last...

brought to you first by FEDERATED!

JUNCTION TYPE (No. RD2517)

TRANSISTORS

(crystal amplifiers)

FOR IMMEDIATE DELIVERY

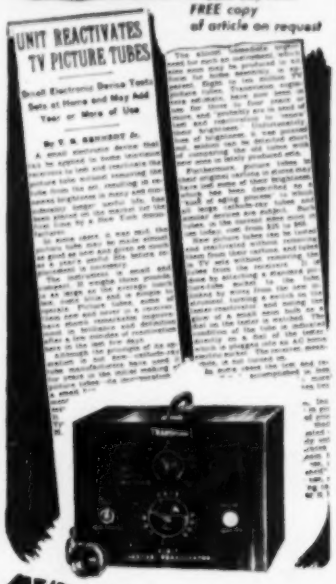


5 COAST-TO-COAST SOURCES OF SUPPLY

66 Dey Street, New York 7, N. Y., Digby 9-3050 | 911 S. Grand Ave., Los Angeles 15, Cal., TRinity 1761 | 925 Northampton St., Easton, Penn., ALlentown 3-7441 | 1115 Hamilton Street, Allentown, Penna., ALlentown 3-7441 | 114 Hudson Street, Newark 4, N. J., MArket 3-9035

Manufactured by the Germanium Products Corp. — a subsidiary of Radio Development Corp. (Under Western Electric Co. and S. J. Weiss Patents)

SO IMPORTANT — it was
Featured in Special Article
in
The New York Times
Jan. 28, 1952
FREE copy
of article on request



**TRANSVISION CR TUBE
TESTER - REACTIVATOR**
performs 2 vital functions:

- **Tests Picture Tubes**
- **Renews Brightness of Dim Picture Tubes**

It's a TESTER:

Without removing picture tube from set, you apply this precise instrument to:—

- *Measure Cathode emission*
- *Locate shorts between elements*
- *Locate high resistance shorts or leakage as high as 3 megohms*

It's a REACTIVATOR
for dim CR Picture Tubes

Restores dim TV Picture Tubes, *without removal of tubes from sets.* Reactivation works on tubes with low light output, if there's no mechanical break in tube, 110 V—60 cycles. *Weighs only 3 lbs.* One or two applications pays for instrument.

SATISFACTION GUARANTEED or money refunded if you return the instrument in 10 days in good condition.

$19.95 NET

RUSH THIS COUPON
TRANSVISION, INC.
DEPT. RN6 NEW ROCHELLE, N. Y.

( ) Send me.....CR Tube Tester-Reactivator(s).
( ) Enclosed find $..... deposit. Balance C.O.D.
( ) Enclosed find $..... in full. Send prepaid.

Name.....
Address.....
City..... State.....

CAN YOU PAY YOURSELF A SALARY?

By HAROLD J. ASHE

Is your service business providing you with an adequate return for capital and time invested?

THE self-critical radio-television service shop owner may very well ask himself whether, in fact, he is a success in his business. Self-esteem may dictate an affirmative answer even though an objective analysis might indicate a contrary conclusion.

While there are many ways in which business success may be evaluated there is one acid test that is paramount. This test is: can the shop owner pay himself a salary out of business earnings, and one commensurate with his value to the shop?

Few people are in business for their health, and service shop owners are no exception. There is not much point in taking on the heavy responsibilities of shop ownership unless there is an adequate financial reward. Nevertheless, there is considerable evidence that a large number of radio-television shop owners are *making less for their time than their highest paid employees.* This means they are making nothing on their capital investment.

How much should a radio service shop owner make to equal the wage or salary of his highest paid employee? If the shop owner's top employee is paid $60 for a 40-hour week, the hourly rate is $1.50. To be equally well compensated, the shop owner must pay himself an annual salary of between $5148 and $6177.60 for his time! And this will only put him on a par with his highest paid employee. This is not a typographical error. Yet, many radio service shop owners fail to net such a return for both personal services and capital, let alone for their services only plus an additional return on capital.

How is such a shop owner's salary arrived at? The thing to remember is that while the employee earns $60 for 40 hours service, the shop owner, on the other hand, devotes 60 to 72 hours or more a week to his business. He gets to the shop early and he leaves late. If he keeps the shop open one night a week, he is the one person most certain to put in a night shift. In addition, he is likely to spend nights in the shop going over his accounts and doing necessary paper work, taking physical inventory, etc.

So, assuming the shop owner values his time as being worth at least as much as his highest paid employee getting $60, he must pay himself far more than that. On a 66-hour week basis his salary should be $99. That's not all. Employees have certain fringe benefits in addition to their pay checks. The shop owner covers them with workmen's compensation, unemployment insurance, old-age social security and sometimes, life insurance policies, and may give yearly bonuses. These add real value to the pay check. Thus, another 10 per-cent should be added to the $99 to compensate for these other valuable considerations obtained by employees. This brings the shop owner's salary to $108.90 a week or at an annual rate of $5662.80.

This $5662.80 still does not provide any reward for the special management skills and responsibilities of the shop owner that distinguish him from even his most valued employee. Neither does it provide for a fair return on his capital. Nor does it give a margin to offset the risks peculiar to the business and which are inherent no matter how sound the management.

—30—

Table 1. Owner's annual salary as compared with compensation paid to employees.

Highest Paid Employee's Salary (40-Hour Week)	Owner's Time Devoted to Business		
	60 Hours	66 Hours	72 Hours
$50.00	$4290.00	$4719.00	$5148.00
60.00	5148.00	5662.80	6177.60
70.00	6006.00	6606.60	7207.20
75.00	6435.00	7078.50	7722.00
80.00	6864.00	7550.40	8236.80
90.00	7722.00	8494.20	9266.40
100.00	8580.00	9438.00	10.296.00
125.00	10.725.00	11.797.50	12.870.00

NOTE: To the foregoing salary should be added an amount representing the fair value of the owner's services over and above the value of the highest paid employee. In addition, there is still an amount to be earned as a return on capital investment.

Small-Town Television

(Continued from page 34)

gally, technically, and financially qualified, and that operation of the proposed station would be in the public interest, convenience and necessity."

After application filing is closed, the FCC must then tackle the tremendous job of ruling on whom shall receive the coveted construction permits. In cities where there are more applications than available channels, hearings must be held to judge the best qualified applicant.

This, as you can guess, is an involved, legal proposition. To make matters worse, the FCC has only seven hearing examiners for the entire United States. This handful of already hard-pressed authorities must make these difficult rulings in addition to their normal work load.

Small wonder that the Commission has already warned applicants not to expect any whirlwind processing of their applications. In fact, George E. Sterling, a member of the FCC, has bluntly stated that " . . . even if we are in a position to process TV applications during April, May, and June, the number of grants we could hope to make within these three months with our present staff would be a small number. The applications will come in a flood—but the output will be but a trickle."

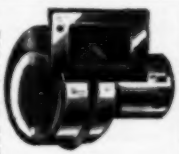
This is indeed another strange example of government economy in a period of unprecedented waste. Mr. Coy said he could only hope " . . . to be dramatically rescued through greatly increased appropriations."

Yet, despite this involved legal procedure, it can be safely assumed that new station owners, and especially those in small towns, will be moving ahead rapidly with plans for actually building their stations once permits have been granted. Fortunately a wealth of valuable information is available to the prospective owner as a guide to the design, construction, and programming of his station. Much of this is to be found in material prepared by equipment manufacturers and in experience reported in trade and technical journals.

This review by RADIO & TELEVISION NEWS is not intended as a substitute for all this information. It would undoubtedly take a shelf of books to begin to blueprint all the aspects of small-town television. More practical in this space is a summary of high points that will help to familiarize prospective station personnel, TV technicians, and studio crews with the vast scope of the operation in which they are about to take part.

The logical jumping off spot of any survey is in the area of equipment. For some time now, announcements have been made warning that equipment for new stations will be so scarce as to jeopardize actual construction plans.

BLOWERS:



BLOWER Illustrated at right; 115 V. 60 cycle, 140 CFM 3000 RPM. 2¾"x4" mounting Flange with 2¾" sq. discharge and 3¼" intake. New. Order No. RN-865. **$12.95**

BLOWER—115 Volt 60 cycle, approx. 100 CFM, dis. 2¾" intake; 2" outlet. Quiet running. Motor size: 2¾"x3¼". NEW. Not Gov't. surplus. Order No. RN-520. **$7.99**

DUAL BLOWER—Same as RN-520 above, except has blower assembly on each side of motor. Order No. RN-800. **$12.95**

CORDS—CABLES

CD-501 Cord f/GN-45 Generator $2.50
CD-218 Cord w/PL-68 & SW-141 & JK-68P f/Throat or Lip Mic. ..... .89
CD-207 Cord—6.5 Ft. w/PL-55 & JK-36 ..... .89
CD-604 Cord w/CG-410 Trans. & PL-54 Plug ..... .89
BC-375 or 191 Cable w/PL-64, 61, or 59 each end 2.50
CD-305 Cord for LP-21 Loop 1.75
MC-215 Tuning Shaft for ZT4N 2.00

TRANSFORMERS AND CHOKES

TRANSFORMERS—110 V. 60 CYCLE PRIMARIES:

Sec. 6.3 Volt 1 Amp $1.25
Sec. 24 Volt ½ Amp 1.50
Sec. 24 Volt 1 Amp 1.98
Sec. Two 12 V. 4 A. windings—gives 12 V. 8 A. or 24 V. 4 A. 3.98
Sec. 6.3 V. 6 A.—6.3 V. 4 A 3.98
Sec. 24 Volt 6.5 Amp 3.95
Sec. 440 VCT/70 MA—5 V/2 A—6.3/4 A. 3.25
Sec. 700 VCT/120 MA—5 V/3 A—6.3 4 A. 32 V./2 A. 4.75
Sec. 400 VCT/60 MA—5V/2 A—6.3/4 A. 6.3/2 A 3.25
Sec. 460 VCT/70 MA—5 V/3A—6.3/4 A. 3.75

CHOKES

8 Henries 500 MA Filter, 5000 V. Ins. $8.95
7.5 Henries—400 MA., 60 ohms, 5000 Ins. 6.95
6.2 Henries—300 MA., 82 ohms, 5000 Ins. 4.95
15 Henries—200 MA., 300 ohms 4.95
8 Henries—500 MA., 80 ohms, 5000 Ins 6.95
4-12 Henries—300 MA., 110 ohms, 1000 Ins. 3.95

BC-223 TRANSMITTER

30 Watt Transmitter with Crystal or MO control on four pre-selected channels. CW, MCW cover frequency range 2500-3500 KC. In use, 28 plug in coils. Complete with tubes and choice of one Tuning Unit (listed below), less Mtg. ..... NEW $32.50
USED (Gov't. Reconditioned) **$26.50**
CABLE—Transmitter to Power Supply $2.00
TUNING UNITS—TU-17—2000-3000 KC; TU-25—3500-5250 KC. ..... $3.50 EACH
Spare VIBRATOR & TUBE KIT f/PE-125BX ..... $ 5.95
PE-125BX POWER SUPPLY f/BC-223—12/24 Volt input; output 475 Volts 150 MA. NEW $4.95
SPARE TUBE KIT in metal box f/BC-223 ..... 2.00
OPERATING MANUAL for BC-223BX 2.00
SHOCK MOUNTING for PE-125 ..... 2.00
PT-171 MOUNTING f/BC-223 ..... 2.00
BC-223 TRANSMITTER—Incomplete, for parts. No front panel or meters. Price—As is $4.95

85 KC IF COIL—BC-453 ..... $1.50 Ea.

RFO—85 KC 75c
1412 KC—IF ..... $1.50 Ea.
500 KC—IF ..... $1.50 Ea.
TU-7-8-9-10-26 for BC-191/BC-375 ..... Used: $3.95

AERIAL WIRE

Aerial Wire—Phosphorous Bronze #16 Stranded. 200 lb. test. Weather-proof. 150 feet on Reel. RL-3 with Clips $1.50

WIRE—HEAVY DUTY RUBBER COVERED

2/#16—20 Ft. Length $1.25
2/#12—10 Ft. Length 1.00
1/#6—Shielded, 15 Ft. 1.50
1/#6—Shielded, 7½ Ft. ..... .75
1/#2—Shielded, 8 Ft. 1.00
1/#6—Cutrm covered—Per Foot ..... .06
1/#14—Shielded, Rubber Covered, 50 Ft. Length $2.75
Or Per Foot, at ..... .06

TELEPHONE WIRE—3 Conductor, copper and steel 325 feet $5.95

POWER SUPPLIES:

VIBRATOR TYPE—6 Volt DC input; output 220 Volt DC 50 MA.—not filtered—w/tube. Ideal for Command Receiver operation as receiver is filtered internally. Size: 4⅝"x4⅝"x3⅛" $4.95

PE-157 POWER SUPPLY—2 Volt Vibrator Supply, operates from RB-54 2 Volt Battery mounted in Case. Output voltage 1.4 V. ⅜ Amp 135 V. 30 MA. Less Battery, Speaker, & External Power Cord—with Vibrator $4.95
BB-54 2 Volt Dry Battery 2.95

AMPLIFIERS:

AMPLIFIER BC-367—Uses two 6V6GT Tubes, Carbon Mic. input. Tapped output. Ideal for Intercom. With Tubes and Schematics, less Dyn. and Case— New: $4.95 Used $4.95
BC-605 Amplifier—with Tubes ..... Used: $3.95
BC-709 Amplifier—with Tubes ..... $4.95—Used: 3.95
BC-747 Amplifier, less Tubes ..... New: 2.95—Used: 1.98

ANTENNA EQUIPMENT



MAST BASE—INSULATED

MP-132 BASE—as illustrated at left. 1" heavy coil spring. 3" insulator. Overall length: 11⅛". Weight: 2⅜ lbs. Price $3.98

MAST SECTIONS FOR ABOVE BASE—Tubular steel, copper coated, painted, in 3 foot sections, screw-in type. MS-53 can be used to make any length, with MS-52-51-50-49 for taper. Price for any section ..... 50¢ Ea.

AN-104A Antenna—100-156 MC $2.00
AN-117 Whip Steel—6 Ft. length 1.00
AN-108A Whip Steel, 5 Ft. w/Base 1.00
AS-27/ARN-5 Ram's Horn, 110 MC—Used 6.95
LP-21-A Loop for ADF outfit.—Used, tested 6.95

DYNAMOTORS:

DYNAMOTOR and BLOWER: 9 Volts DC input; output 450 Volts 60 MA. 4500 RPM. At 6 Volts DC input; output 300 Volts 65 MA. 3000 RPM. Price $4.95

INPUT:	OUTPUT:	STOCK No.:	PRICE:
14 V. DC	600 V. 300 MA.	DD-85	$9.95
12 V. DC	220 V. 70 MA.	DM-34	6.95
12 V. DC	330 V. 100 MA.	DM-19	6.95
14 V. DC	375 V. 150 MA.	DM-37S	6.95
14 V. DC	330 V. 135 MA.	DM-33S	7.95
14 V. DC	500 V. 500 MA.	PE-94	14.95
12 or 24 V. DC	275 V. 110 MA.	USA/6516	3.95
12 V. DC	250 V. 50 MA.	DM-25	6.95
12 V. DC	250 V. 60 MA.	DM-32 (Used:	2.95
12 or 24 V. DC	500 V. 50 MA.	USA/9515	3.95
14 V. DC	1000 V. 250 MA.	RD-77 (Used)	6.95
28 V. DC	1000 V. 250 MA.	PE-73 (Used)	2.95
28 V. DC	250 V. 60 MA.	PE-86	2.95

PLUGS AND CONNECTORS:

PL-113 Plug for LP-21 Loop $1.25
PL-P-103 Plug for BC-348 ..... 1.50
MC-211 Rightangle Adapter for Comm. Sets ..... .50
M-358 Rightangle Coaxial Connector ..... .25

CONTROL BOXES:

	NEW:	USED:
C-87/ART-13—f/ART-13 Trans. MR-1/Control Box f/RA-10 Rec. w/Mtg.	$ 6.95	$4.95
BC-434 for ADF	12.95	
BC-732 for Localizer	6.95	3.95
BC-401 Reel Control Box w/Cannon	2.95	1.95

AUTOSYN TRANSMITTER:

Autosyn Transmitter from LP-21A Loops, used with I-61 or I-82 Indicators. Operates from 26 Volt 400 cycle. With calibrated Dial and Correction Pointer. MC-507 ..... $6.95 MC-317 ..... $8.95

GEAR TRAIN MOTOR

Ball bearing, low inertia reversible type. 588 RPM. Extra large gear. ⅜ RPM operation by Volt 400 cycle or 13 Volt 60 cycle. Removed from LP-21 Loops. Type—10047-2-A $4.95

GEAR MOTOR

110 Volt 60 cycle for slow motion lighted displays or production work. Machine cut brass gears. Size 3" H. x 2½" W. x 1⅝" D. Shaft: ⅜"—3 1". Choice of 2, 5 or 24 RPM, specify RPM desired. Price $6.75

METERS:

0-150 Volt, 400 cycle, 2½" Rd. $3.95
0-5 Amp. AC, 3" Rd., 0-75A Scale 3.95
0-5 Milliamp DC, 2½" Sq., 0-5 Scale 3.95
0-1 Milliamp DC, 2½" Rd., 0-150 Scale 3.95
0-500 Microamp, 2½" Rd., 0-15 & 0-600 DC Volt Scale 3.95
TUNING METER I-70B Reverse Scale, Weston #666 for Compass Control Boxes 3.95

MOUNTINGS AND CLAMPS:

PT-154 for BC-348 Receiver $2.50
PT-470 Mounting & Clamp 1.00
MC-476 Maple Rail for above—f/Fairlead 1.00
MC-396 Wood Clamp for Fairlead ..... .75
M-235 Bobbin & 250 Ft. W-108 Antenna Wire 3.50
WT-7 Weight for Trailing Antenna 1.50

MISCELLANEOUS

Leg and Seat Assy. for Hand Generator ..... $ 3.50
BC-230 Transmitter, with Tubes 4.95
T-26 ARC-1/BC-457 Trans.—4 to 5.5 MC 12.95
R-7 ARN-1 Transceiver—Receiver & Control 14.95
R-1/ARR-1 Rec. (converted to 220 MC 4.95

Address Dept. RN • Minimum Order $5.00 • Prices F.O.B., Lima, O. • 25% Deposit on C.O.D. Orders

FAIR RADIO SALES 132 SOUTH MAIN ST LIMA, OHIO

NOW . . . AT O-R . . .
THE "BAY" MOBILE ANTENNA!

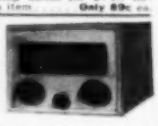
Here is that new 75 meter mobile antenna that is providing such excellent performance for West Coast amateurs. The "Bay" utilizes a new method for center loading, a design that has repeatedly outperformed other good mobile antennas in direct comparative on-the-air tests. Completely streamlined, (maximum diameter is only 1¼"), handsome in appearance, the top whip and center loading section are both completely protected by a Fiberglass sealed covering. It's weatherproof . . . you operate in any weather without detuning. All exposed parts are brass, beautifully chromed for permanent luster. Overall length is approx. 9' 3" when trimmed. Make your signal outstanding . . . use a "Bay."
Only **$19.95** net

POWER SUPPLY FOR ANY 274-N RECEIVER

Just plug it into the rear of your 274-N RECEIVER . . . any model. Complete kit and black metal case, with ALL parts and diagrams. Simple and easy to build in a jiffy. Delivers 24 volts plus B voltage. No wiring changes to be made. Designed especially for the 274-N receiver.
Only $8.95.
Filament trans. for 274N receivers. Pri. 110V, 60 cy. AC. Sec. 24V @ 6A. An excellent buy at **$1.95** ea.

O-R exclusive . . . tuning knobs for 274N Receivers, a hard-to-obtain item . . . **Only 89c** ea.

Now available, the beautiful MORROW CONVERTER Model 10B for 10-20-75



A truly outstanding converter specifically designed for highest stability under rough service. Chassis is fabricated from heavy aluminum, all parts rigidly mounted. Electrically, this unit is one of the finest available to the mobile user. Compare the following features, then select Morrow.
1 microvolt sensitivity—all bands.
Tuned preselector, mixer, oscillator.
Low drift, (temperature compensated) calibrated oscillator.
I.F. amplifier with 4 tuned circuits. Output freq. 1525 kcs.
Single point tuning, no images, no birdies.
Antenna trimmer on front panel.
AVC on preselector, no strong signal blocking.
Automatic noise limiter built in.
Full width dial—calibration accuracy 1%.
Glare-free, edge illuminated dial.
Units come complete with mounting hardware and instruction book. Dimensions, 4" high, 6½" wide, 6½" long.
Model 10B . . . . . **$64.95** net

NOVICE 500V POWER SUPPLY KIT

Here is all the makin's for a sweet little power supply suitable for 807's. Includes: Power transformer, 2—4mfd, 600V oil filled condensers, 1—10 henry choke, 1—5U4 rectifier, 1—socket, 1—chassis, line cord, power switch and terminal board. Supply output voltage is 500 volts at 200 ma. . . . . **Only $10.95** kit



LOOK! NO HANDS!

This mike leaves both hands free for mobile QSO's. Fastens to operator by simple snap strap. Adjustable. Double action sw. operates push-to-talk or holds on.
Only **$2.00** ea.

TRANSFORMERS-CHOKES:

920-0-920 cr 740-0-740 AC @ 200 ma. Pri. 115V, 60 cycle, AC. Upright shielded case. Excellent for 807's. **Only $10.00** ea.

5V, 25A. Pri. 115V, 60 cy. AC. A real rugged job excellent for 304TL—4-250A etc. Limited quantity. Only **$4.50** ea.

10H, 200 ma choke. Hermetically-sealed steel case. Also has hum-bucking tap. A beautiful item only **$1.98.**

Power transf. Pri. 115V, AC, 60 cy. Sec. 520-0-520 @ 200 ma. . . . . **$8.25** ea.

750-0-750 @ 100 ma. 6.3 @ 4A. 6.3 @ 4A. 5V @ 3A. Pri. 115V, 60 cy. AC. only **$7.95** ea.

750-0-750 @ 200 ma. Pri. 115V, 60 cy. AC. 5V @ 3A. 6.3 @ 5 amp. In shielded case. Only **$8.00** ea.

350-0-350 @ 350 ma. 6.3 @ 10A. 5V @ 6A. Pri. 115V, 60 cycle. Only . . . . . **$8.95** ea.

Minimum order $2.00. All items subject to prior sale. All prices subject to change without notice. 20% deposit must accompany all orders, balance C.O.D.

OFFENBACH & REIMUS CO.
1564 MARKET ST.
SAN FRANCISCO, CALIF.

Yet, in one of a series of exclusive interviews for this article, an official of *RCA* denied this situation.

He said, in part, " . . . availability of v.h.f. equipment offers no problem today. Most manufacturers can supply this in quantities sufficient to keep up with the number of new stations licensed by the FCC." He added, however, that " . . . u.h.f. equipment will probably be scarce this year, but the outlook is good beginning in 1953."

When one gets into the subject of station equipment, the first impression is that you've walked by mistake into a discussion of taxes or foreign loans. The talk all starts with five figures and generally moves up from there. There's no mistake, though. Television transmitting and studio equipment costs a lot—far more than either AM or FM gear ever did in their plushest times. Yet this is only relative to the size of revenue.

Manufacturers point out that the owner of a new station will actually find some costs lower and availability greater than he would have four years ago. This is true for several reasons.

Greater production of tubes, for example, has brought their cost down. What's more, the tubes of today give longer life at less cost of operation than did the early models. Circuits, too, are more stable and greatly improved. Lastly, the equipment is easier to operate, generally smaller in size, and thus easier to service. A 5 kw. v.h.f. transmitter cost $88,500 in 1949 whereas a 10 kw. model sells today for only $79,000.

Still many other specific items and services have gone up as much as 15 to 20 per-cent. Greatest increases will be found in towers, transmission lines, and studio equipment with physical costs connected with installation and construction varying with the section of the country.

Cost comparisons between v.h.f. and u.h.f. transmitters are rather difficult to make since u.h.f. gear is nowhere near full production. The v.h.f. transmitters have come down in price during their development and it is expected that u.h.f. gear will do the same. But for the time being, u.h.f. models cost more than v.h.f. units of comparable power.

Probably the greatest advantage a new station owner has today is the availability of commercially-built transmitters. In 1949, virtually all equipment was custom-made. That meant that the owner had to pay much higher prices for his equipment and even so faced frequent expensive readjustments.

Today *RCA*, as a typical manufacturer, offers a complete line of ready-made transmitters that includes seven different models. An owner can step up and buy outright a 500 watt, a 2 kw., 10 kw., 25/20 kw., and 50 kw. v.h.f. transmitter. In antennas, he can select turnstiles in combinations of 3-bay, 5-bay, and 12-bay.

The u.h.f. channel transmitters come in 1 kw. and 10 kw. with standard u.h.f. antennas. Power gains from 3 to 12 are provided and an owner can get effective radiated power up to 200 kw. on any channel from 2 to 83. These again are all standard items that can be selected to best serve the individual requirements of an owner.

As a gauge of costs, here is the price tag on some typical items of equipment—not including land, buildings, or supporting tower for antenna—for a typical small-town station. A 2 kw. v.h.f. transmitter putting out a radiated power of 10 kw. on Channels 2 or 3 is $44,200. A five-section superturnstile antenna for the same transmitter runs about $33,000. Eleven hundred feet of 3⅛-inch transmission line is $9200. Frequency and modulation monitors are $2900; film equipment (including two projectors, film camera, and control equipment) is $28,900. Audio-video equipment including sync generator, amplifiers, power supplies, etc., is $15,300; test and measuring equipment, $4000.

The total: $137,500. This again is basic transmitting equipment only for a station having just film or network operation. For a complete two camera-equipped studio, including switching facilities, monitors but not including lights, air conditioning, etc. add on another $65,585. Then if you are thinking about remote shows, better set aside another $27,765 for microwave and mobile units.

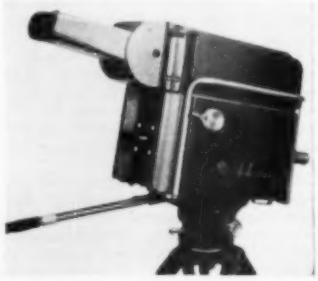
You're getting close to a quarter of a million dollars there—and it's still only a 2 kw. rig.

A 1 kw. u.h.f. transmitter putting out a radiated power of 20 kw. on Channels 14 to 83 starts at $64,700 for the transmitter and ends up with a bill for $145,200 covering the complete set-up, less, of course, cameras and other live pick-up gear.

Up in the big money brackets is a 10 kw. u.h.f. transmitter putting out 200 kw. radiated power on Channels 14 to 83. It comes to $230,500 for just the transmitting and monitoring apparatus without any studio equipment at all!

The requirements of every small-town owner will naturally call for different combinations of transmitters and antennas but the consulting services of all major manufacturers are available. Taking advantage of this professional skill in the early planning

RCA's new image orthicon TV camera.



stages will certainly save much time and money later on.

As a general rule of thumb, though, there are certain recommended minima that will meet the requirements of a small town. In terms of transmitter equipment, here are some suggested basics for carrying out film and network operations. (The manufacturers usually consider a TV studio as simply another signal source. Thus the studio arrangement can be planned entirely separately from the transmitting and film facilities.)

In each transmitter room, four major components will be found.

(1) Transmitter, including vestigial sideband filter, antenna diplexer, and dummy load.

(2) Rack equipment consisting of:

(a) Sound and visual frequency and modulation monitors as required by FCC.

(b) Synchronizing generator.

(c) The d.c. power supplies for operation of video amplifiers, master monitors, etc.

(d) Audio input equipment such as preamplifiers, limiting and monitoring amplifiers.

(e) Video input equipment such as stabilizing amplifiers, video jacks, monoscope camera, and test equipment.

(3) Audio-video control desk—designed to handle the switching and fading of six video signals and their corresponding audio counterparts.

An example of the progress made in station design is the unique "package" TV stations now available. These are actually entire TV stations which will go on the air with a minimum investment in equipment and technical manpower.

The unit sold by *RCA* is called the "Basic Buy" and includes all facilities necessary to handle TV shows received from the network with local station identification. In addition, local revenue is provided by having equipment that will take local shows and commercial announcements on films or slides.

The "Basic Buy" station includes these units, which again reflect the facilities that most small-town operators will need:

(1) A transmitter and an antenna.

(2) Monitoring equipment.

(3) Film and slide equipment.

(4) Monoscope camera (for reproducing a test pattern).

(5) Control console (one-man operated).

How much physical space is required to house a station is another question pertinent at this time. This element is obviously affected by your technical facilities but, in general, there are five things to consider when planning your station building. These are:

(1) Size and power of the transmitter.

(2) Particular floor arrangement of individual units.

(3) Space or clearance between units.

"CONICAL-V-BEAMS"
*REGISTERED TRADE MARK

Now! Customized for your locality
CUSTOM-DESIGNED ANTENNAS
at mass production prices!

Another Telrex first in superior antenna service. Famous Conical-V-Beams custom designed for best results in your particular area. Regular list prices prevail, meaning you get better performance, more satisfied customers and your selling territory for TV receivers is increased tremendously. Installing customized Telrex antennas is insurance against callbacks due to antenna adjustments and you enjoy the added protection of Telrex super-durable, all weather construction. Just specify the installation area when ordering. Telrex will supply your antennas cut-to-area for the finest pictures ever!

—for superior reception on TV, FM and UHF

CLOVER-V-BEAM NEW E-Z-RIG
A high-gain, compact indoor or outdoor array.

DUBL CONICAL-V-BEAM
For outstanding all station performance. Has new HI-V-REFLECTOR.

TELREX "FISHBONE"
Ten WORKING elements. Guaranteed to outperform any Yagi.

TELREX "BAT-WING"
Outperforms any top-of-set antenna with no tuning or pruning.

TELREX-V-BEAM
For superior in-line all station reception at low cost.

TELREX CONICAL-V-BEAMS WITH HI-V-REFLECTOR
Standard on Monarch and Universal Series.

"CONICAL-V-BEAMS" are covered by Patent No. 23,346
CANADIAN and FOREIGN PATENTS PENDING

Originators and Manufacturers of "CONICAL-V-BEAMS" —INSIST on the original!

telrex INC.
CONICAL-V-BEAMS
AMERICA'S OUTSTANDING TELEVISION BEAM
ASBURY PARK 7, N. J.

TRAIN AT HOME FOR UHF-TV AND
TELEVISION SERVICING

Learn practical, professional type TV Servicing *without leaving your present job*. Included are money-making extras such as set conversion, master antenna installation, UHF-TV, field servicing short cuts. You can start earning Television money after first few lessons. You learn to test, trouble shoot and repair all types of TV sets.

HERE'S HOW YOU GET EXPERIENCE!

You train on a large screen, modern TV receiver, furnished with the course and yours to keep! As an optional feature you can get two weeks actual experience with Chicago's largest independent servicing organization. You learn by doing! Age is no barrier. Many students are over 50! ACT NOW! Send for FREE Catalog and SAMPLE LESSON today!

TELEVISION COMMUNICATIONS INSTITUTE
205 W. Wacker Dr., Dept. 1-X, Chicago 6, Ill.



MAIL NOW FOR FREE BOOKLET

MILTON S. KIVER, President
TELEVISION COMMUNICATIONS INST.
205 W. Wacker Dr., Dept. 1-X, Chicago 6, Ill.
Rush FREE Catalog and Sample Lesson. I am not obligated. Salesman will not call.

Name..... Age.....
Address.....
City..... Zone..... State.....
☐ BEGINNERS check here for Pre-TV Radio Course

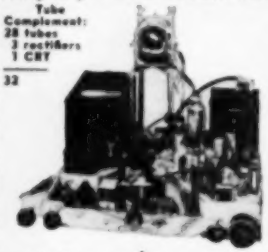
MATTISON

SILVER ROCKET
630 CHASSIS with
• TUNEABLE •
BUILT-IN BOOSTER
for Better DX Reception

Featuring NEW CASCODE TUNER made for UHF interchangeable tuning strips and 70° COSINE YOKE

Tube Complement: 28 tubes 3 rectifiers 1 CRT

32



All Channel Booster

- Broad band single knob control pre-amplifier built in to eliminate long leads which may cause regeneration and attenuation of signal.

• ONLY THE MATTISON 630 CHASSIS HAS AN ALL CHANNEL TUNEABLE BUILT-IN BOOSTER THAT INCREASES SIGNAL STRENGTH UP TO 10 TIMES. THE SILVER ROCKET WILL OUT-PERFORM ANY CHASSIS MADE AND IS PRICED RIGHT TO SELL FAST WITH AN EXTRAORDINARY MARGIN OF PROFIT FOR YOU. WRITE FOR CONFIDENTIAL PRICE SCHEDULE.

• Mattison features a complete line of cabinets MADE IN MATTISON'S OWN CABINET FACTORY. 36 breathtaking designs that blend perfectly in any setting, traditional or modern.

DEALERS!
SERVICE-DEALERS!

Here is YOUR opportunity to become the "important" TV Dealer in your area for THE FINEST CUSTOM-BUILT LINE OF TELEVISION RECEIVERS.

FREE! *Write for MATTISON'S merchandising portfolio explaining:*

"THE MATTISON UNASSEMBLED PLAN"
and
"THE MATTISON $1,000,000 FLOOR PLAN"

SALESMEN—AGENTS

Choice Territories Available. Become a Factory Sales Representative. Prefer men with experience selling direct to dealers.

When you buy from Mattison you need only one source of supply! You can buy a Mattison Chassis, a Mattison Cabinet or a complete Mattison TV Set!

Manufactured with integrity

Mattison Television & Radio Corp.
893 Broadway, Dept. RG, N. Y. 3, N. Y.

(4) Number of rooms desired.
(5) Plans for future expansion.

There is certainly much room for individual decisions in this area. Yet it is surprising just how little actual floor space is required for on-the-air operation. A 1 kw. u.h.f. station can be comfortably housed in one large room measuring 900 square feet. A typical floor plan permits the broadcaster to enclose the film projectors, multiplexer and film camera if he desires, but this involves only a partition and not any additional space. The announcing studio may likewise be set off from the control room by the conventional booth arrangement.

A 10 kw. u.h.f. or v.h.f. station can be accommodated in about 1100 square feet, again with variations that include the separate announcing booth, engineering work shop, closed off film room, etc.

Designers retained by the major manufacturers have done considerable research into the subject of floor plans and suggested layouts down to the placement of each microphone, console, and chair are available as a guide. These can greatly assist a local station owner in simplifying his own building problems.

As indicated earlier, live studios can be considered apart from the transmitting room and so may actually be located in a different part of town. In some cases, it might be more economical to have the live-talent studio on another floor of the same building or merely as an extension of the transmitter and control room. In any case, it's well to repeat that studios can be added efficiently to a station set-up at any time.

There are, once again, certain minima that must be met. These include the following:

(1) Studio camera, control unit, and power supplies.
(2) Metal tripod, friction head, and dolly.
(3) Microphone boom stand.
(4) Rack containing power supplies.
(5) Microphone.

If more elaborate programming is planned or if the studio is remote from your control facilities, additional equipment will be needed. This includes more studio cameras, switching gear, and "on-the-air" monitor, audio consolette, sync generator, and turntables.

No discussion of small-town television is complete without something more than a nod in the direction of WTTV in Bloomington, Indiana—a town of 28,000 people. There the nation's first small-town TV station was founded in the fall of 1949 by Sarkes Tarzian, an enterprising local businessman and manufacturer.

For almost four years, this station has stood as the prototype of things to come in community TV. Bloomington still remains the smallest community in the U.S. to have a TV station.

Mr. Tarzian had to pioneer at every step of the way from building the

CUT HOLES 1/2" to 3 1/2"
IN RADIO CHASSIS



WITH A GREENLEE RADIO CHASSIS PUNCH

● Save hours of work . . . no reaming or tedious filing. Punch cuts through chassis quickly . . . makes accurate, clean holes for sockets, plugs, and other receptacles. Just turn with an ordinary wrench. There's a GREENLEE Punch in each of these sizes: ½"; ⅝"; ¾"; ⅞"; 1"; 1⅛"; 1¼"; 1⅜"; 1½"; 1¾"; 1⅞"; 2"; 2¼". Write for complete facts. Also get information on Knockout Punches and Cutters for conduit and meter holes up to 3½". Greenlee Tool Co. 1886 Columbia Avenue, Rockford, Illinois.

TOOLS FOR CRAFTSMEN
GREENLEE

Leotone

G.E. TUNGAR BULBS . . #30650L, 2 Amp . . 1.79
#30660L 400ma . . 1.49
SOUND POWERED HANDSET . . Ideal for TV work. Instrument. No Batts. No Xtmr. 88-55.95 . . pair 10.95
HS-30 HEADSET with cord & cup . . 2.49
HS-30 MATCHING TRANSFORMER . . .59
BRUSH CRYSTAL HEADPHONES . . pair 4.95
Unimpd. . . ea 3.95
JK-20 PL-55 CONNECTORS . . set 30c . . 6 1.09
12½ FT. WHIP ANTENNA . . 4 steel screw sects. 1.98
SAS FUSES . . 3 or 5 Amp. ea .07 . . 100 4.95
AUTO GENERATOR CONDENSERS . . Small, metal . .39
"POLYSTYRENE" . . 12" lgths RG8/U—10c; ⅝"—20c; ¾"—30c; ⅞"—55c; 1"—70c . . 1.29
TUBING (O.D.) ¼"—10c; ⅜"—12c; ½"—17c; ⅝"—23c; ¾"—27c; 1"—36c; 1½" . . 1.25

"HEARING AID SPECIALS" . . .
MIDGET OUTPUTS (⅝x⅞x⅞" . . 2.49
200Ω spkr. to V.C. . . ea .49c
MIDGET AUDIO CHOKES (1¼x1¼x1¼") 4 500 ohms DC . . ea 30c . . 6 2.49
HEARING AID AMPLIFIER . . tube, MADE A REAL VEST POCKET RADIO adding simple tuner (1¼x2¾") WITH SCHEMATIC FOR 2 or 3 TUBE SET. Less tubes, case . . 2.49
HEARING AID TUBES . . set of 2 for above . . 2.98
HEARING AID MINIATURE CONTROL RECEIVER UNIT (⅞x⅞x1⅛" Excel. Mfr.) MAGNETIC CONTACT MICS. DETECTOPHONE. MINI-SPKR . . Lo-impd. . . 3.49

HI-FIDELITY CRYSTAL HAND MIKE . . Hi-impd. Moulded Bakelite case, 5½ ft. cable . . 3.95
T-44A MAGNETIC MIKE . . brand new . . .98
RADIO HARDWARE TREASURE . . FULL LB. CAN of: Nuts, Screws, Lugs, Washers, etc. 69c
110V AC MOTORS . . 1730 RPM, fract. H.P. . . ea 1.98
1/3 shaft 1¼x2¼" . . 1.75
BARRIER TERMINAL BLOCK . . 20 brass feed-thru 6-32 holes in moulded bakelite, 1¼x9x1" . . .69

"ALNICO MAGNET SPECIALS" . . .
Magnet . . 2"x1¼"x⅝" . . 1.39
FLAT BAR . . 1½"x⅜"x.16" . . .79
ROUND BAR . . ⅜"x1½" . . .79
BLOCK MAGNET . . 1"x⅞"x⅝" . . 25c, 12 2.50
ALNICO CHIP MAGNETS . . Assort. 90 pcs./or . . ea 15c . . lb. 1.50
ALNICO MAGNET KIT . . Powerful Bar, Block, U, Rod, Ring, etc. Kit of 10 assted. . . 1.98
(WRITE FOR LATEST "ALNICO" SUPPLEMENT)

MORE & MORE FOR YOUR MONEY!!! . . with the JUMBO RADIO PARTS KIT . . FULL LBS. of: COILS, RESISTORS, WIRE, SOCKETS, CONDENSERS, SWITCHES, CONTROLS, ETC., ETC. Ship. wt. 20 lbs. . . 3.95
MOULDED BAKELITE CONDENSERS . . .00002 to .2mfd . . 200-600V. Kit of 20 assted. . . 1.98
CARBON RESISTORS . . ½ to 2 W, 100 assted. . . 1.95
±20 PUSH-BACK WIRE . . Red,Yel,Blue,Blk(100ft) .69
FACTORY SPEAKER REPAIRS SINCE 1927

Min. Order $3.00. Only 20% deposit req. on all C.O.D.'s. Full remittance with foreign orders. Please add sufficient postage—excess refunded.

LEOTONE RADIO CORP.
67 Dey Street
New York 7, N.Y.

transmitter to programming the broadcast schedule. But his experiences have given prospective owners a vast amount of practical operating knowledge. One industry executive said that WTTV had literally saved small-town television five years of experimentation.

First of all, it is agreed that small-town television is commercially sound. After one year on the air, WTTV was "in the black"—certainly an encouraging note for all new owners. Then his novice crews, many totally inexperienced, showed how local personnel could be trained to present top quality shows.

Interested radio station owners and businessmen "bitten by the TV bug" have visited WTTV regularly for years now, studying every phase of its operation from sales to camera techniques and from script writing to transmitter maintenance. As a result, information that could be had only through trial-and-error is available to the entire industry.

Many improvisions made by Tarzian's staff prove that ingenuity can help offset some of the high costs of TV equipment. Bathroom fluorescent light fixtures and amateur photographic flood lamp reflectors double as studio lights; paper-maché hamburger meat cartons serve as sound proofing; a microphone boom was made from old pipe for $29.30, and a studio pick-up camera was actually built for $400 worth of parts!

On the other side of the ledger, Tarzian wanted to bring in network shows but was not in line with existing facilities. So he built, at a personal expense of $110,000, a two-tower radio relay network to pick up the signals from Cincinnati.

This, admittedly, is not the usual answer to the next problem before a new station owner, *i.e.*, his position in regards to the networks. In many cases, the contractual agreements between TV stations and the networks are patterned closely after those in radio. But other aspects of the relationship are very different.

If there is only one TV outlet in a city, it may, for example, carry programs of all four networks—*NBC*, *CBS*, *ABC*, and *Du Mont*. This arrangement generally finds the town's only TV station serving as a "primary affiliate" of one network. As such, the station agrees to carry a certain volume of commercial network programming. This is known as "network option" time.

Other than this time, the station can draw upon the schedule of other networks or use the time for himself, *i.e.*, as "local option" time. Obviously this permits even a small station to have some of the best fare available for its listeners.

Details of contracts between a network and any given primary affiliate are generally secret but they all call for the local outlet to give the network a specified discount from the card rate for time. It, in effect, sells its time to

HERE ARE Some Real BUYS!

I. D. 6B APN4
LORAN INDICATOR SCOPE
less tubes, like new ONLY **$29.95**

R9 APN4, complete with tubes, like new $17.95
BC 624 receiver (SCR 522), less tubes, used $19.95
BC 625 transmitter (SCR 522) less tubes, used 19.95
SCR 522 transceiver, complete in case with top bracket, less tubes 29.95
BC 376H Test Oscillator, excellent 69.50
TS170 ARN5 glide path test set, excellent 69.50
RS ARN7 ADF receiver, excellent 74.50
less tubes, used 59.50
BC-1633 Marker Beacon Receiver (convertible to BC-1333), exc. cond 19.95
LP21LM ADF loop, excellent cond 79.50
MC134 Flexible Cable, per length 2.95
TS10 APN Altimeter Test Set, new 19.95
TS16 APN Altimeter Test Set, new 24.95
TS184 AP Signal Generator, new 99.50
TS51 APR4 Test Set for bomb release equipment ..... new 89.50
TS251 Loran Test Set, less crystal, BUT NEW 199.00

SCR 625 Famous Army Mine-Detector

For Prospectors, Miners, Oil Companies, Plumbers, etc.

This unit is being offered now at a considerable reduction in price. Recently advertised at $79.50 it is now available in the same brand new wrappings in suitcase style carrying case (less batteries) at **$59.50** WHILE THEY LAST! Used, like new, $39.50

MIKES and HEADSETS

HS-33 Low Impedance Headset, exc. $2.95 ..... new $1.98
CD-307 Ext. cord for HS 23-33 ..... like new .25
Throat Mike—T 30 ..... New .98
Lip Mike—Navy Type ..... New .98
Extension Cord and Switch Assembly for lip and throat Mikes ..... New .98
CW 49305 High Impedance headset complete with leather headband and rubber cushions. ..... Used **98c**
RE-39, Microphone ..... new $4.95
TS 10 sound powered HAND SET used, ex. 5.95
HS-30 ..... exc. $1.95 new 2.29
HS-30, miniature headset ..... new 2.49
..... used 1.49
HB-7 Headband, used, exc 1.25

WOBULATOR

See page 43—December "Radio News" $5.95 ea.

REAL BUYS!

	Used	New
RL 42 Antenna Gearbox Motor and Reel	$ 4.95	$7.50
PE-101 Dynamotor	2.75	
BC-1023 Marker Beacon Receiver, complete with tubes, shock mount and instruction manual		9.95
PE 206 Inverter	4.95	
Scott Hi-Fi output transformer		1.49
PE-218 Inverter		29.95
SCR-522, transceiver, less tubes	29.95	
BC-709, battery operated, lt. wt., inter-phone amplifier, complete with tube, shock mount and manual, brand new, ea.		$3.95
ARC-4 Transceiver—100-150 mc, 2 meter, used, excellent condition, less dynamotor, with tubes		$32.95

BC 604 FM Transmitter—20-27 mc. 10 Channel crystal controlled, push-button, excellent for conversion to 10 and 11 meters, small quantity on hand, in good used condition, less dynamotor, some minimg side covers, etc.—otherwise complete, including tubes **$7.95**

COMMAND (SCR 274 N) EQUIPMENT

	Used	New
BC-453, less tubes	$14.95	
BC-454, 3-6 mc receiver, less tubes	7.95	
BC-455, 6-9 mc receiver, with tubes	9.95	$14.95
less tubes	7.95	
BC-457, 4-813 mc transmitter, less tubes	5.95	
BC-458, less tubes	5.95	
BC-459, less tubes	12.95	
T-23 ARC 5, 100-156 mc xmtr		49.50
BC-400, 2 position Rec. Control Box		1.95
MC-315 Mechanical Drive Shaft, per length		2.45
BC-439 3 Receiver Remote Control		2.95
BC-451 Transmitter Control Box	.69	1.50
BC-442 Antenna Relay, less condensers—used	1.95	

CATHODE RAY TUBES

16JP4-$19.95 **16DP4-$19.95**
90-DAY GUARANTEE

VIBRATORS

2 Volt—7 Prong Synchronous 69c
10 for $4.25

SCR 508 EQUIPMENT

FT 237 Mounting ..... 19.95 Exc. Used
Crystals, Set of 60 ..... 29.95

RA 52—RECTIFIER

A transtat controlled rectifier to produce high voltage DC from 110 VAC 60 cycle source. Up to 11,500 volts DC at 80 watts. Metered high voltage (0-15KV) and current (0-20 MA). New **$74.50**
Some available with small repair or minor part replacement, less tube ..... only $49.50

RT7/APN1 TRANSCEIVER UNIT—Used as an altimeter, it may be converted for signaling control circuits, etc. Complete with 14 tubes and dynamotor they are in good used condition at the amazingly low price of $24.95
Used, less tubes, with wobulator 14.95

MONTHLY SPECIAL
RT 34 APS 13 Transceiver used as a tail warning redar on 415 MC. Containing a 30MC IF Strip and various other parts, these units have been stripped of RF sections and all tubes but are an excellent buy if only for parts and IF Strip. Used $5.95

Shipments FOB warehouse. 20% Deposit on orders. Minimum order $5.00. Illinois residents, add regular sales tax to remittance. Prices subject to change without notice.

R W ELECTRONICS Dept. N, 1712-14 S. Michigan Ave., Chicago 16, Ill. PHONE: HArrison 7-3214



LOOK FOR THE "SIGN of QUALITY"

J.S.C. in wire means greatest efficiency at most reasonable cost. More than a million TV sets required more than one hundred million feet of J.S.C. 300-Ohm TV Lead-In Wire. From coast-to-coast at more than one thousand distributors!

JERSEY SPECIALTY CO., LITTLE FALLS, N. J.

SAVE THAT TV TUBE
SAVE YOUR PROFITS
THE ORIGINAL
PICBOOST
RESTORES BRILLIANCE
to OLD TV PICTURE TUBES
NOT A "HOT SHOT" REJUVENATOR



MODELS #1 & #2 $7.95 LIST
OTHER MODELS SLIGHTLY HIGHER

1-MINUTE INSTALLATION

- Adds over a year to tube life
- Universal for all types of picture tubes, regardless of socket
- Filament heater voltage applied to picture tube instantly
- Smooth continuous control
- Limits peak inrush current
- Reduces tube contract risks

NO DANGLING LINE CORDS
NO MOVING PARTS
NO TIME DELAY TO DAMAGE PICTURE TUBE

WRITE TODAY FOR CATALOGS

SOLD THROUGH RECOGNIZED DISTRIBUTORS

C-B-C ELECTRONICS CO.
620 ARCH ST PHILADELPHIA 6, PA

the network which, in turn, bills the commercial sponsor at a figure above that cost for coverage in the area. Conversely, the network will offer sustaining shows to the station which can be broken into with local commercial spot announcements.

There are several methods of getting the network signals and these will vary according to local facilities. The most common way to bring in network programs is via the radio relay system as operated by *American Telephone & Telegraph Company*.

Through this system of beamed microwaves, the network shows are carried along "highways" made up of relay stations generally about 30 miles apart. Stations along the way can be hooked into the system via parabolic "dishes" that beam the microwaves to their transmitter towers.

This service is obtained by paying line charges to *AT&T* and not to the network. If a microwave link or coaxial cable line isn't available, a station may also construct a single relay on some high point and put in, at its own expense, an automatic relay. In this case, the station arranges to pick up the signal from a nearby station with network affiliations.

Thus the TV station in Grand Rapids, Michigan, gets its programs from WNBQ in Chicago which sells its services to Grand Rapids.

The third option is exercised if a station wants to build its own relay system (as was done by WTTV) or to order one as was done by WTMJ-TV in Milwaukee, Wisconsin. It has a seven-tower relay system bringing in all network shows from Chicago.

Officials of the Long Lines Department of the *AT&T* are quick to point out, however, that the relay networks which carry TV shows are not built for this purpose at all. They are first and foremost a means of carrying telephone communications.

For that reason, both coaxial cable and radio relay systems will, of necessity, follow the route of the heaviest load of telephone traffic. Because of the tremendous backlog of telephone equipment orders and the expense of putting in such relay nets, *AT&T* will undoubtedly not build lines to remote areas in the near future.

However, there are 86 TV stations in 46 cities now served by *AT&T* relay systems and this number will jump as soon as new routes are completed. A quick glance at the cost sheet of such equipment will show why expansion is generally limited. The coast-to-coast hook-up now in operation cost upwards of 40 million dollars.

What does this mean in terms of small town TV? Well, the picture isn't as bleak as it might seem. *AT&T* is rapidly extending its radio relay system which will bring programs to many new locations.

Also, a small station can effectively use kinescopes of network programs which was the basic means of presenting name shows on the West Coast for several years. These filmed versions

STAN-BURN
S-P-A-R-K-S

ANTENNAE SPECIALS
CIRCLE X Limited quantities ..... $2.00 each
1-11 / 12 Or More
DOUBLE V ½" ..... $2.98 / $2.20
DOUBLE V ¾" Dowel ..... 3.45 / 2.45
DOUBLE V ¾" Dowel ..... 3.95 / 2.95
10 Element Conical ¾" ..... 3.55 / 2.55
Folded 101 Straight Low Quick Rig ¾" elements ..... 4.25 / 3.25
WINDOW CONICALS ..... 4.95 / 3.75
MASTS
5 FOOT SWEDGED ..... .79 / .60
10 FOOT PLAIN ..... 1.39 / 1.29
TV WIRE
88 MH. 300 OHM ..... $14.95 M Ft.
72 OHM COAXIAL ..... 45.00 M Ft.

CATHODE RAY TUBE SPECIALS

10BP4	ZETRA	$14.95	16TP4A	DUMONT	$26.00
10BP4	N. U.	19.95	17BP4A	FEDERAL	23.00
10BP4A	N. U.	19.95	17BP4A	DUMONT	26.00
12LP4	ZETRA	18.95	19AP4	SHELDON	29.95
12LP4A	THOMAS	19.95	19AP4A	G.E.	39.95
16AP4	ZETRA	26.00	19BP4A	THOMAS	39.95
16AP4A	G.E.	30.00	20CP4A	DUMONT	39.95
16DP4A	THOMAS	28.80	20CP4A	SHELDON	37.00
16GP4A	RAULAND	33.00	21EP4A	DUMONT	42.95
16GP4	ZETRA	26.00	24AP4A	SHELDON	63.00
16JP4A	THOMAS	29.80	24AP4A	G.E.	76.00
16RP4A	GE & SU	26.00	Single Ion Traps		39c
			Double Ion Traps		69c

CHASSIS 630 REGAL with Cascode Tuner $139.50
21 KV FLY BACK similar to RCA 2.49
OPEN FACE CABINET 39.00

TRANSFORMERS
Nationally Advertised
RCA type for 16" to 24" KOS2 ..... $3.85
G.E. type for 10" to 24" KO45 ..... 3.85
These are very special prices while they last!
DEFLECTION YOKES
COSINE FERRITE TODD YOKE 70° $4.20
SPECIALS
4 Prong Vibrators, each ..... $ 1.39
Lots of 12 or more 1.19
Standard TV Tuners 10.95
12" Heavy Duty Speaker ..... Special 9.98
AUDIO DEVICES, DISCS and TAPE IN STOCK
Audio Plastic Red Oxide Plastic Tape—
Half hour speed 92.30
One hour speed 3.50
WIRE RECORDERS IN STOCK
WILCOX GAY—Model 2A10 ..... $ 89.97
RADIO CRAFTSMAN
Model 973C—2-speed Tape Recorder ... Net $10.00
Model RC8—(HF) Amplifier ..... Net 42.06
Model RC10—AM-FM Tuner ..... Net 129.27
Model C9—Williamson Amplifier ..... Net 97.93
Special Guaranteed Tuners (with Glow) ..... $ 9.95
SPECIAL! While they last $21.95
AUTHORIZED DISTRIBUTORS for: General Electric, Konrad, Yung-Hsi, National Union, Jewell, De Wald, Regal, Automatic and Solohot Cartoon.
We carry a complete line of popular makes of Radio and TV tubes, at 50% discount. Also many other special purpose and transmitting types, and all electronic parts and equipment at lowest prices. Send us a list of your requirements for prompt quotations.
Terms: 20% with order. Balance COD. All prices F.O.B. NEW YORK Warehouse. Minimum order $5.00.
Write for our latest price list to Dept. RNG

STAN-BURN RADIO and ELECTRONICS CO.
(C.B.S. THEATRE BLDG.)
1697 BROADWAY • NEW YORK 19, N.Y.



EVERY RADIOMAN
Can Use These
SERVICE HINTS!
Valuable Manual Yours—FREE!

Every page of "How to Simplify Radio Repairs" is packed with on-the-bench practical ideas. Contains photos, charts, diagrams—no fluff—no vague theory. In plain every-day language it gives you priceless suggestions—new servicing ideas. You'll use and benefit from the experience of experts. Partial list of contents: How to Localize Trouble; How to Service Amplifiers; How to Test for Distortion; How to Test Audio Circuits; How to Test Speakers; How to Find Faults in Oscillators; How to Test Radio Parts—and it's all yours—FREE! No obligation.



FEILER

SEND COUPON OR GOVERNMENT POSTCARD FOR YOUR FREE COPY TODAY!

FEILER ENGINEERING CO., Dept. GH2
6028 N. Bonticello Ave., Skokie, Ill.
Suburb of Chicago
Please RUSH my FREE copy of "How to Simplify Radio Repairs."
Name .....
Address .....
City ..... Zone ..... State .....

are quite adequate for anything except exceptionally timely material and the rapid transportation of kinescopes from source to station can help bridge this time gap.

It is apparent that the owner of a new TV station has, from the start, an eager viewing public. The nation is certainly sold on TV and will readily take to almost any program schedule. Even so, it is economically important that a concerted effort be made to build a substantial audience as soon as possible.

This is necessary in terms of revenue since rates charged for local and network programs reflect a careful analysis of the listener area. A sizable audience must be presented to the network before it will be interested in buying local time.

Unlike radio in its early days, television cannot afford a slow, gradual build up. In rapid succession, programming must be prepared that will cultivate a good, loyal audience. Since the original costs and operating charges connected with TV are so high, the outlay must be met rather quickly to bring about the sound development of the station.

Despite the huge investment involved, the TV industry admits that big money is there to be made—and in a comparatively short time. Most stations can look for a profit after the first year, officials indicate.

One of the secrets of this success lies in programming. The local station manager has within his power the ability to make or break a station. Program costs can easily skyrocket far out of proportion to the income derived if not carefully watched. That's why the industry looks to small town stations for an entirely new format for shows.

"There is no reason why small stations should put out big money for expensive variety shows," explained one network official. "A station with network affiliation can offer its audience some of the nation's finest dramatic and variety personalities.

"Why then should a local manager try to compete with these and waste his capital. It's far wiser—and much better programming sense—to develop shows that have an exclusive local appeal, ones that can't be done by anyone else. County fair coverage, for example, high school sports, band contests, county agriculture demonstrations and talks, local festivals . . . all are absolutely perfect for TV. The appeal of such programs is universal and balance wonderfully well with the more lavish but impersonal network shows."

Again, Bloomington's WTTV gives some concrete examples of this advice. "Meet Your Teacher" is one of their low budget shows that has an excellent following. "Call To Order" is a public service program that sets the style for this important type of presentation. The town's mayor is moderator and city officials come before the cameras to answer questions put

SEE LEO FIRST FOR . . . .

hallicrafters



I can SAVE you money . . . Liberal Trade-ins

SPECIAL NOTICE—NEW SX-73 NOW AVAILABLE AND IN STOCK—$975.00



$169.50

S-76 RECEIVER

Extra selectivity with double superheterodyne circuit. One RF, two conversion and 3 IF stages. Range 550-1550 Kc, 1.7-34 Mc in four bands. 8 tubes plus voltage regulator and rectifier. Complete with tubes, less speaker.



$199.50

SX-71 RECEIVER

Double Conversion sharp selectivity, plus built-in NBFM at moderate cost. 11 tubes plus voltage regulator and rectifier. Low down payment.

NAME YOUR TERMS • LOW DOWN PAYMENTS • PERSONALIZED SERVICE

HALLICRAFTERS RECEIVERS AVAILABLE FOR IMMEDIATE SHIPMENT

S-38B	$49.50	S-72 Portable	$109.95
S-40B	$99.95	SX-62	$289.50
S-81	$49.50	S-78A	$89.50
S-82	$49.50	R-46 Speaker	$19.95

Famous WRL RADIO REFERENCE MAP 25c



CU on 10-20 & 75 Meters

NEW LOG BOOK 25c

For mobile or fixed station. Spiral binding. Full column log listing all FCC required info. Will accommodate 1,525 stations. "Q" signals, phonetic alphabet, amateur international prefixes.

PHONE 7795

JUST OFF THE PRESS!

WRL 1952 CATALOG

Send for your copy today. Contains everything new in radio and television. Jam-packed with bargains. Leo I. Meyerson, WØGFQ





FREE

WRITE—WIRE

World Radio LABORATORIES INCORPORATED COUNCIL BLUFFS IOWA

WORLD RADIO LABORATORIES
744 West Broadway
Council Bluffs, Iowa
R-6

Please send me:

☐ Radio Map ☐ S-76 Info
☐ New Catalog ☐ SX-71 Info
☐ Used Equipment List ☐ New Log Book

Name .....
Address .....
City ..... State .....

Using a Williamson?

Double your power output, reduce distortion by 50%!!

ACRO TO-300

"World's Finest Transformer,"

$24.75 net

convert to Ultra Linear Operation by simply changing three resistors and condensers! Rx—$1

- Response ± 1 db 10cps to 100,000cps
- Rated to handle 40 Watts
- Resonance-free response
- Unequalled square wave response
- Low phase shift
- Most quality per dollar!



ACRO TO-310 — Same ratings but 20 watt. For converting all popular 10 watt 6V6 amplifiers to the sensational Ultra Linear Operation $18.75

ACRO TO-290 for the Original Williamson Amplifier. Performance equal to the finest—regardless of price! $10.75

All units fully potted in attractive grey hammertone case. Compact, only 3¼" x 3¼" x 4¼" high.

FREE!

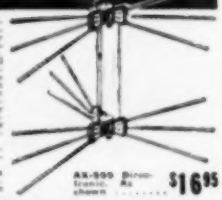
Write for 12 page ACRO data, Amplifier and conversion schematics

HARRISON RADIO CORPORATION

225 GREENWICH STREET
BARCLAY 7-7777
NEW YORK 7, N. Y.

For A Clearer Sharper Picture
Replace Your Old TV Antenna
with the Famous
Rocket
DIRECTRONIC
MOTORLESS TV ANTENNA

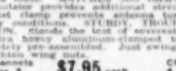
360° Electronically Switched Beam
• No Motors
• No Roof Orientation
• No Electric Power
• No Ghosts
Flick of Switch Clears Picture Instantly



The Directronic 10-element 360° selector is the finest for ultrahigh or long-distance reception. The RF-PAT molded insulator is a material of extreme tensile strength not affected by weather or temperature, either mechanically or electrically. Included in the AX-900 Directronic's Array are 16 hi-tensile aluminum alloy elements. Universal U Clamps for mast to 1½" dia. Directronic Beam Selector. 75 feet of Tri-X Cable. AX-90 Directronic, 9-element Single $10.95

AX-900 Directronic As shown $16.95

Where Else Can You Find Bargains Like These



Rocket YAGI
5 ELEMENT
TV ANTENNA
Excellent Pictures in Fringe Areas

HIGH GAIN. Minimum interference from ghosts and noise due to a directive pattern. Five elements include one folded dipole, three directors, and one reflector. Supplied less mast. MATCHES 300 OHMS IMPEDANCE. Molded insulator provides additional strength. Exclusive design lead clamp prevents strain during or resting under any condition. STURDY, TROUBLE-FREE CONSTRUCTION. Stands the test of severest weather. Elements of extra heavy aluminum-clamped top and bottom. Completely pre-assembled. Just swing elements into line and tighten wing nuts.

Channels 2 or 3 ..... $7.95 each
Channels 7 to 13 ..... $3.95 each
Channels 4, 5 or 6 ..... $6.95 each

EACH CHANNEL requires a DIFFERENT Yagi. When ordering specify exact channel number desired.

BIG PRICE CUTS ON CONICALS

All Channel Conicals—Single Bay	$ 2.95
All Channel Conicals—Stacked Array with Tie Rods	6.60
Mast Steel (Duplexed 5" Crimped) 1¼" O.D.	1.08
Mast Steel (Duplexed 10') 1¼" O.D.	1.98
Mast Steel (Zinc Plated 10') 1¼" O.D.	1.50
Mast Connectors for 1¼" O.D. Mast—10"	.40
Chimney Mount Complete with Straps	1.10
Peak Roof Saddle (will take up to 1¼" O.D. Mast)	1.40
Lightning Arrester—TV	.69
Galvanized Guy Wire—6 strand #20	3¢ ft.
Galvanized Guy Wire—11 strand #20	11¢ ft.
300 ohm Twin Lead 7/32 Stranded (500' Reel $7.50)	2¢ ft.
300 ohm Open Line Twin Lead—500' Reel	$22.50
Mast Stand-off Insulators—2"	6.50 C
Stand-off Screw Insulators—3"	2.75 C
Stand-off Screw Insulators—5"	3.75 C

Rocket Products sold only by mail by National Electronics

Never Before in America
NEW AMAZING
Snyder Directronic INDOOR TV ANTENNA



CLOSETS

All channels. Anyone can install. Adheres to any surface. 360° electronically switched beam. No Ghosts. Flick of switch clears picture. Complete kit includes Directronic indoor antenna, 360° Beam Selector, three loop elements, Tri-X Cable, Twin-X Cable, and necessary fasteners for use where needed.

$5.95
Complete, Model 10-303



ATTICS



CEILINGS

Prices Subject to Change Without Notice
ALL PRICES F.O.B. CLEVELAND, OHIO
Do not remit more than complete purchase price. Pay shipping charges on receipt of goods. 25% deposit on C.O.D. orders, please. Money-back guarantee.

FREE CATALOG
of TV antennas, accessories at lowest prices. Tells about our fast service, free installation help. Write, send name, address now.

National Electronics
OF CLEVELAND
THE HOUSE OF TV VALUES
106 DELCO BUILDING, CLEVELAND 3, OHIO

to them by representatives of church, social, and civic groups.

In the Quad City area of Rock Island, Moline, East Moline, Illinois and Davenport, Iowa, WHBF-TV has done an outstanding job in community program development. The staff of this enterprising station gained tremendous local prestige this spring when they carried the semi-finals and finals of the Illinois State Basketball Tournament direct from Champaign, Illinois.

The tourney play, by far the most popular state-wide sporting event of the winter, originated with a telecast by WENR-TV, Chicago. Since Champaign is on the St. Louis-to-Chicago coaxial cable, the program was carried to Chicago by direct line. Then, in Chicago, it was fed back via *AT&T* radio relay facilities to Rock Island and WHBF-TV.

The same "feed" technique was used for the Iowa-Illinois basketball games which were originated by WGN-TV in Chicago and put out on the radio relay link to Ames, Iowa, via Rock Island.

Another locally-produced show is one that utilizes the talents of the faculty and students from Augustana College. This is a forum-type program that demonstrates the excellent use that can be made of nearby colleges and universities as talent sources.

As this article has indicated, the development of small-town television will be neither easy, inexpensive, nor especially rapid. It's going to take much hard work and huge capital outlays to bring these community stations into being.

Yet it is an amazing tribute to the industry that there has been no shortage of willing backers or any lack of public support. The entire scope of the move is best appreciated when one considers several historical facts.

Radio broadcasting began in 1920 and today there are 2300 AM and 640 FM stations on the air. Television got underway only four years ago. Yet already it has a target of 2000 stations to be built and booming within another year or so!

No one can even begin to predict what impact this nation-wide system of video broadcasting will have on our national life. It is sufficient to note that the readers of this page will witness—and probably take an active part in—the greatest sweep of mass communications that this nation has ever seen or will be likely to be repeated in our lifetime.

—30—

The 45th anniversary of the invention of the 3-element vacuum tube and the 50th anniversary of its inventor's entrance into wireless telegraphy were celebrated recently at a testimonial dinner given in honor of Dr. Lee de Forest at the Waldorf-Astoria in New York. At the affair a bronze bust of Dr. de Forest was presented to Yale University, his Alma Mater. Many of the pioneers and leaders in radio and television were on hand to pay tribute to "The Father of Radio," and to hear former-Governor Charles Edison of New Jersey (who described himself as an "Edison Effect") and Rear Admiral Ellery W. Stone (both shown at the left) extol the past and present contributions of the 79-year-old inventor, who is at present at work on transistor improvements. Former President Herbert Hoover, one of the guest speakers at the dinner, ranked Dr. de Forest alongside of Faraday, Edison, Morse, and Bell as the "outstanding men of genius who have transformed the mysteries of science into those great inventions which have shaken civilization into new channels." In the early days of radio development, Dr. de Forest often used the pages of RADIO & TELEVISION NEWS (or "Radio Amateur News" as it was then called) to describe his new inventions. "The Audion and The Radio Amateur" was written by Dr. de Forest for this magazine in 1919, and is one of the first authoritative articles on the applications of triodes. Shown with Dr. de Forest in the photograph (in addition to Mr. Edison and Admiral Stone) are Mrs. Catherine Allaben, and Frederic Allen Williams who sculptured the bust of Dr. de Forest.



International Short-Wave

(*Continued from page 94*)

Honduras—Radio Monserrat, HROW, 6.675, noted signing off 2304; fair level with some QRN, QSB. (Oestreich, Washington State) Soon should have (recorded) *English* announcements. (Serrano, Brazil)

Hong Kong—ZBW3, 9.525, is seldom heard but occasionally comes through shortly before 1031 sign-off. (Gay, Calif.)

India—Current schedules of *All-India Radio*, just received via airmail, are—To East and Southeast Asia, Australia, New Zealand 1930-2000, 15.290, 11.850; 2030-2200, 15.160, 17.740; 0200-0320, 21.700, 15.190; 0600-0815, 17.705, 15.190; 0830-0945, 17.705, 15.380. To Middle East, Central Europe, United Kingdom, Burma, Philippines 0200-0330, 21.700, 15.190; 0230-0330, 17.740, 15.160; 0600-0700, 17.705, 15.190; 0830-0945, 17.705, 15.380. To China, Japan (Sat., Sun. *only*) 0530-0600, 17.740, 15.160. To East and South Africa, Mauritius 2300-0010, 11.850, 9.670; 1045-1215, 11.710, 9.550. To West Indies 1830-1930, 15.290, 11.850, 9.720, 7.170. To Burma 1945-1955, 9.720, 7.170; 0615-0600, 17.740, 15.160. To China 0430-0545 (to *only* 0530 Sat., Sun.), 17.740, 15.160. To Indonesia 1745-1800, 11.790, 9.550; 0700-0730, 17.740, 15.160. To East and Southeast Asia 1930-2000, 15.290, 11.850; 2030-2200, 17.740, 15.160; 0200-0320, 21.700, 15.190; 0600-0815, 17.705, 15.190; 0830-0945, 17.705, 15.380. To Fijis 0200-0320, 21.700, 15.190. To West Pakistan 2230-2245, 11.710, 9.630, 7.290; 0945-1000, 5.960, 4.870. To Afghanistan 2215-2230, 7.290, 5.960; 0030-0130, 9.670, 7.170; Fri. *only* 0845-0930, 4.870; 1130-1230, 7.170, 5.990, 4.940, 3.945. To Persia, Afghanistan 1230-1330, 7.260, 7.170, 5.990, 4.940. To Saudi Arabia, Egypt, Lebanon, Syria, North Africa, Trans-Jordan, Sudan 2315-0015, 11.760, 9.720; 1230-1455, 7.125, 5.960. To Europe 1400-1515, 5.990, 9.720, 7.170; 0230-0330, 17.740, 15.160; 0830-0945, 17.705, 15.380. *English* news periods are listed 1400-1410, 9.720, 5.990, 7.170; 1930-1945, 11.850, 15.290; 2310-2320, 11.850, 9.670; 0300-0310, 17.740, 15.160; 0830-0840, 17.705, 15.380, and 1045-1055, 11.710, 9.550.

Bombay noted with news 2130 on 6.150, at 0300 on 9.550, at 0730 and 1030 on 4.840; Calcutta heard with news 2130 on 7.210, at 0730 on 6.010, at 1030 on 3.30 (Huntsman, Burma)

Indo-China (Vietnam)—Radio France-Asie, Saigon, tried 9.720 recently for a few days, then returned to 9.752A; noted 0930 with all announcements in French. (Rosenauer, Calif.) Heard on 11.924 with bi-lingual programs 0800-1030 (UNESCO news Tue. 1015-1025); news in French 1030-1040 when leaves air after "La Marseillaise." (Ridgeway, South Africa) Heard on measured 15.440 with news 0500. (Hutchins, Sanderson, Australia) Pearce, England, notes that the 11.920 and 9.752A channels vary in



Only Crescent "Intermix" Has All These Features

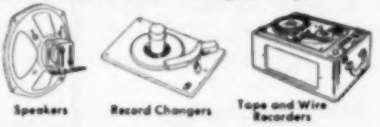
- Plays all size records in any sequence . . . no adjustment
- Simple, trouble-free design
- Will not jam . . . no out-of-cycle tone arm damage
- Only 3 moving parts in center post
- New center post design for minimum center hole wear
- Turnover or universal type cartridge optional
- All tone arm adjustments from above mounting plate
- Slip-over spindle for 1½" center hole records optional
- Completely automatic shutoff after last record is played

The only record changer that plays 7, 10 and 12 inch records automatically . . . intermixed!

Here at last is a competitively priced automatic record changer that plays all records, intermixed, without any regulation by the listener!

Exact turntable speeds at all times for all records coupled with precision tone arm performance provides a new high in quality of reproduction obtainable up to now only by use of a separate 45 RPM changer.

In addition, extreme simplicity of design and precision manufacturing assure long, trouble free performance. Write for full information about this new kind of record changer, *today!*



CRESCENT INDUSTRIES, INC., 5900 W. Touhy Ave., Chicago 31, Ill.

RADIO'S NEWEST CREATION

***Privat-ear* Radio**

Smallest Real Personal Pocket Radio



- Privat-Ear is Electronic Magic!
- A Tiny ear phone of Special Design lets you enjoy your favorite programs in complete privacy
- Large 4-Tube Set Performance with 2 Tubes plus Diode Crystal Detector
- Weighs Less than 8 ozs. including Batteries
- 50 mile Daytime Reception
- Dimensions: 2¼" wide, 5¾" long, ⅞" thick

Approved by Civilian Defense

PRIVAT-EAR CORPORATION

2018 Broadway Ave., New York 60, N. Y., Telnadge 3-1005

Write for Brochure

Dealers—Distributors Some Key Territories Available



Picture Tube *Rejuvenator*

- Simple Plug-in
- Permanent Hook-up
- Applicable to all Size Tubes
- Save on Service Contracts
- Automatically Operated
- Only $6.45 List

Hermetically Sealed
Miniature and Sub-Miniature

Audio Transformer



MANUFACTURED to meet most exacting MIT-27 specifications

STYPOL impregnation prior to potting assures quiet operation and long life under all adverse conditions

MU-METAL core assures a light weight, compact unit with full efficiency and wide frequency response

SENSIBLE DELIVERY: send your B/P specifications for quotations and delivery schedule

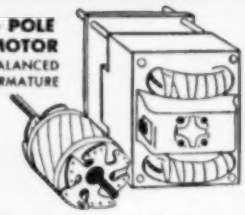
Jobbers Inquiries Invited

CREST LABORATORIES, INC.

Whitehall Building, Far Rockaway, New York

See us at the Electronics Parts Show in Chicago

What to look for in a record changer...



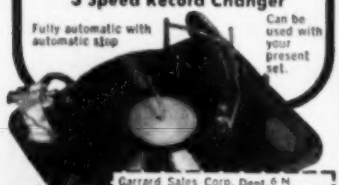
4 POLE MOTOR BALANCED ARMATURE

Eliminates wow, rumble and flutter.

One of many features which make

GARRARD

The World's Finest
3 Speed Record Changer



Fully automatic with automatic stop

Can be used with your present set.

MODEL RC 80 **$42.30** net less cartridges

Garrard Sales Corp. Dept. 6 N.
164 Duane St., N. Y. 13, N. Y.
Send GARRARD Fact Sheet.
Name.....
Address.....
City..... Zone... State...

STAR SPECIALS

NEWEST ITEMS! LOWEST PRICES!



GENERAL INSTRUMENT 3-SPEED CHANGER

Same model used in popular TV-Radio-Phono combinations. Plays 33⅓, 45 and 78 rpm records in 7", 10" and 12" sizes. Perfect for custom installations or modernizing old-type consoles. Brand new, packed in original factory carton, a real buy at only..... A-1749 **$17.95**

—LATEST TEST EQUIPMENT—

SIMPSON 276 OSCILLOSCOPE CALIBRATOR



Adapts any oscilloscope for quick and accurate voltage measurements by comparative methods. Big 4½" meter. Reads RMS 0.06 to 90, peak 0.1 to 125, and peak-to-peak 0.2 to 250 volts; all measurements in 6 ranges. Black molded bakelite case identical to Simpson 260; carrying handle. Operates from 105-125 volts, 50-60 cycles..... **$28.91**



TV PICTURE TUBE REACTIVATOR

Restores most low emission tubes up to 80% of original brilliance; adds 50% to picture tube life. Rejuvenates pure barium coating on surface of tube cathode. Cannot harm picture tube. Brightens up old sets and trade-ins.... **$14.65**

SEND FOR OUR BIG BARGAIN CATALOG!

STAR ELECTRONIC DISTRIBUTORS, INC.

Dept RN-6 7736 S. Halsted, Chicago 20, Ill.

sign-off between 1030-1100 now. The 11.920 outlet has news 0900, reports Rosenauer, Calif.

"The Voice of Vietnam," 7.089A, Saigon, noted 0830 with *English* session; news 0845, off 0900. (Ridgeway, South Africa, others)

Iran—Radio Tabriz, 6.090, sent letter by registered mail; said now broadcasts *English* lesson at 2045-2100 Teheran time (1245-1300 EST) on Mon., Wed., Sat. (Pearce, England)

Radio Teheran is again using EPB, 15.100, for news 1500; has news in Russian 1515. (Kary, Pa.)

Iraq—HNQ, 11.724A, Baghdad, was logged recently at fair to good level around 0445-0600; Arabic; had this one once around 1000 but with much QRM. The 11.724 outlet is now scheduled 2330-0100, 0430-0600, 0830-1500. (Radio Sweden) Heard 1415-1500 closedown with program in *English* called "A Date With Baghdad;" ended with Iraqi National Anthem. (Pearce, Catch, England)

Israel — 4X4EA, 6.728, is heard through bad CWQRM in parallel with 9.010A from 1300 onwards; not as good as latter channel; has news 1430-1445. (Ridgeway, South Africa) Tel-Aviv, 9.010A, now begins *English* session ("Voice of Zion") at 1615. (Robertson, Mass.) Usually closes around 1715. Pearce, England, says announces *English* for 0645 on 6.830.

4XB24, 8.170, Haifa, noted 1530 with news in native and music for local listeners. (Sanderson, Australia)

Italy—Rome has been noted on a *new* channel of 9.708A with *English* for North America daily 2145-2200; North American transmission begins 1900. (Baitzel, N. J.) Rome, 15.402, has fair to good level some days around 0430 with news in Italian at slow speed; woman announcer. (Saylor, Va.) Noted with news 0320 on 15.400A, 15.120; at 0435 was parallel on 11.905, 15.120, 15.400A with news in Italian at dictation speed. (Bellington, N. Y.) On Sundays, Rome, 11.905, has "Weekend Journal" in *English* 1400-1415. (Schroth, Mass.)

Rome heard 0615 on 15.400A; 1030 on 17.800; 1508 calling South Africa on 17.800; 9520 to 1545 sign-off on 15.400A; 15115 on 11.90, and 1900 on 9.780; all with *English* and at good level in Mass. (Golden) Noted on 11.905 with news 1400A. (Niblack, Ind.) Heard well on 9.57A ending news 1920. (Bishop, Ohio, others)

Italian Somaliland — Mogadishu, 7.380A, noted with good signal lately; signs on 1000 in Arabic; Italian at 1200 (Italian news 1225A); is heard to 1300 usually—but sometimes extends session to 1400 when leaves air with a lively tune in dance tempo; on extended schedule usually plays operatic records 1300-1400; some days is not heard at all. (Ridgeway, South Africa)

Jamaica—Radio Jamaica was noted recently on *measured* 12.056 at 1730 with special sports broadcast; signed off 1740; strong signal in Calif. (Ballou) Robertson, Mass., reports this

special broadcast as on approximately 11.950, heard from 1600.

Japan—The British Commonwealth Occupation Force outlet at Kure, 6.105, is now known as the *Britcom Base Broadcasting Station*. (Hutchins, Radio Australia)

Radio Japan noted to North America 0000-0100 over JOA3, 11.705 (announced JOB, 6.069, in parallel); includes news in *English*, commentary in *English*, Japanese classical music, news and commentary in Japanese; still asks for reception reports to International Broadcasting Section, Radio Japan, Tokyo, Japan. (McPhadden, Calif., others) JOB2, 11.705, and JOA2, 9.675, noted in transmission to Philippines, Indonesia 0900-1000; high level on 9.675 also 1030-1130 to India. (Ridgeway, South Africa)

Lebanon—Beirut, 8.036A, noted with *English* program opening 1002; at 0955 was in Arabic. (Pearce, England)

Liberia—ELBC, 6.028V, was recently *measured* on this channel at 1645 when had music; previous measurements were 6.023, 6.025. (Oskay, N. J.) Closes 1845. Noted at press time with *English* newscast 1815 (was on a Saturday, may not be daily (?).

Madagascar—*Radio Tananarive* sent schedule of 9.515, 6.172, 3.205, 1550 kc., in French daily 2230-0030, 0400-0600, 1000-1430, and Sundays 2300 (Sat. *EST*)-0245, 0330-0600, 0915-1430; on 7.374, 9.693 with Malgache daily 2230-0000, 0320-0530, 0900-1200, and Sundays at 2300 (Sat. *EST*)-0045, 0330-0530, 0900-1200. (Pearce, England)

Malaya—*Radio Malaya*, 4.825, Singapore, is again coming through with fine strength; has news 0900; should be parallel 7.200. (Rosenauer, Calif.) Heard on 6.135 at 0630 with news. (Sanderson, Australia)

BFEBS, 7.120, Singapore, noted 1120 with music to India-Pakistan; some QSB and CWQRM. (Flynn, Calif.) Has *replaced* 15.300 with 15.435, noted there 0900 with relay of "Radio Newsreel" from BBC; closed down on 15.435 at 0915, but re-opened at 1100 on 15.435 with news relay from BBC; at 1115 announced 17.755, 15.435, 11.955, 7.120; closed 1145 with "God Save the Queen." (Pearce, England; others) Noted on 9.69 at best level around 0930-1030; also heard on 15.435 and 11.955 at 0600-0915. (Boggs, Mo.)

The 15.435 channel noted in Calif. signing off 0827 with "God Save the Queen." (Winch)

Mexico—"La Voz de Mexico" (relaying XEX) has been noted evenings (*EST*) on 6.065; seems parallel 11.900; opens 0800A. (Stark, Texas) Cushen, N.Z. says new call of *Radio Morelia*, 6.030 is XESF; formerly was XEKW; heard signing off 2330 and asking for reports. (ISWC, London)

Monaco—*Radio Monte Carlo*, noted 1033-1037 with accordion music; 1043-1059 with popular music; announced "Ici Monte Carlo" at 1100; heard only at 0930. (Lane, Wyo.)

Mozambique—Lourenco Marques, 11.764A, noted around 0000 in *English*. (Lund, Iowa) Is again audible on West Coast, signing on week-days 2300. (Rosenauer, Calif.) The 31-m. channel used for *English* programs afternoons (*EST*) seems to have settled down on approximately 9.760; noted to 1600 when signs off after Ted Lewis' "Goodnight Song" and "A Portuguesa." (Boice, Conn., others) Noted Sundays signing off 1600. (Losee, N. Y.) Runs to 1700 Saturdays.

Heard with Portuguese on 15.287A around 1230; noted same day in Portuguese to 1630 sign-off on 9.635A. (Stark, Texas) Station lists CR7BG now as on 15.285. (Radio Sweden) The 4.932A channel is audible some days just prior to 1600 sign-off (1700 on Sats.). (Kary, Pa.) Parallels 9.760A. Pearce, England, flashes he now notes the 15.287A channel signing on in Portuguese 1100.

The 31-m. outlet for Portuguese programs is still "wandering"—more recently noted on 9.79A at 0012; at times is as high as 9.85A. (Bellington, N.Y.)

New Caledonia—*Radio Noumea*, 6.034, noted signing off 0530A with "La Marseillaise;" good level in Kansas. (Dary)

New Zealand—ZL10, 15.22, noted parallel with ZL4, 15.28, around 0100; good level; 15.28 is best; ZL3, 11.78, is at high level in the 1300-1545 season. (Ridgeway, South Africa) ZL3, 11.78, noted signing on 0200, usually at

LEARN Practical RADIO AT HOME



COMPLETE ONLY . . . $19.95

BUILD 15 RADIOS

ABSOLUTELY NO PREVIOUS TRAINING NEEDED
EXCELLENT BACKGROUND FOR TELEVISION

FREE RADIO TESTER & SOLDERING IRON

10-DAY MONEY-BACK GUARANTEE

WHAT THE 1952 PROGRESSIVE RADIO "EDU-KIT" OFFERS YOU:

This is a practical home radio course. You learn theory, construction, operation, trouble shooting, code. You build RECEIVERS, TRANSMITTERS, AMPLIFIERS, CODE OSCILLATOR, SIGNAL TRACER.

You start with a simple radio circuit, and gradually advance to more complex circuits. No previous background is required. No instructor is needed. All parts and instructions are included and every single step is clearly explained.

All parts are guaranteed, individually packaged, identified, and explained.

There is nothing extra to buy. You receive all parts, tools and instructions at once. You keep everything; there is absolutely nothing you return to us.

You can easily pay for the kit in a short time by repairing radios. Use the tester and signal tracer for servicing. The signal tracer alone is worth more than the price of the entire kit.

USED BY RADIO SCHOOLS AND GOVERNMENT AGENCIES!

The Progressive Radio "Edu-Kit" includes tubes, paper condensers, mica condensers, electrolytic condensers, variable condensers, selenium rectifiers, chassis, hardware, tie strips, tube sockets, solder, wire, soldering iron, tubing, coils, instruction book, radio tester, etc.; in brief, everything you need in a practical radio course.

Send for further information and receive FREE Radio & TV Trouble-Shooting Guide. Or order direct from this ad and receive FREE Code Oscillator Key (Value $2.95) in addition to Radio and TV Trouble Shooting Guide.

Postage prepaid on Cash orders—C.O.D. orders accepted in U.S.A.

PROGRESSIVE ELECTRONICS CO.
497 UNION AVE. -:- DEPT. RN-6 -:- BROOKLYN, NEW YORK

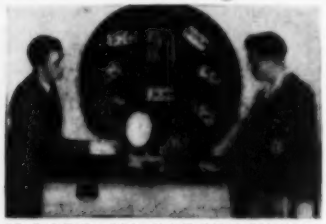
GET A WELL-PAYING JOB



GO INTO A PROFITABLE BUSINESS AND PLAN FOR A FUTURE



Become an Electrical Engineer



MAJOR IN ELECTRONICS

- **B. S. Degree in 36 Months**
- **Radio-Television Technician Certificate in 18 Months**

Experts predict that by 1964 there will be *at least* two positions for every engineering and technical graduate. This College offers a tested plan that permits you to enter these vast employment opportunities at an early date. First—you save a valuable year through optional year-round study. Second—you can receive *advanced credit* for prior training gained in the armed forces, other schools or field experience.

ENTER BOTH RADIO AND TELEVISION THROUGH THIS PLAN

12 months or one-third of the B.S. degree course (Electronics major) — also brings you the *Radio Technician's* certificate. An added 6-month course qualifies you for the *Radio-TV Technician's* Certificate.

The Famous "UNIT CHASSIS SYSTEM"



of teaching was developed here. It "breaks down" the TV set by stages. You learn every component of all types and makes—and are prepared for future design changes, including the advent of color.

SPECIAL! Television Clinics

Ambitious Radio and TV Servicemen can enroll now in special clinics in July and August — to handle latest field service problems. Write for full details.

Over 48,000 former students from all states and 23 overseas countries. Faculty of trained specialists. Modern laboratories and equipment. Nonprofit technical institute and college 49th year.

MILWAUKEE
SCHOOL OF ENGINEERING
• FOUNDED 1903 •

Terms open July, October, January, April

FREE — Write for "Occupational Guidance Bulletin," "Your Career" booklet, and Catalog.



Milwaukee School of Engineering
Dept. MPR-652, 1025 N. Milwaukee
Milwaukee, Wisconsin

Without obligation send Catalog for Electrical Engineering, B. S. Degree, major in ☐ Electronics ☐ Power ☐ "Your Career"; Occupational Guidance Bulletin (one: ☐ Radio-TV; ☐ Electrical Power; ☐ Welding; ☐ Heating, Refrigeration Air Conditioning; ☐ TV Service Clinic.

Name..... Age.....

Address.....

City..... Zone..... State.....

If veteran, indicate date of discharge.....

good level. (Niblack, Ind.) ZL2, 9.54, beamed to Pacific, and ZL3, 11.78, beamed to Australia, are used parallel 0200-0545; ZL3 has best signal. (Stein, Calif.)

Nicaragua—Radio Mundial, 6.465A, announces call of YNWA. (Stark, Texas) Should sign-off 2400. Patterson, Ga., reports YNVP, 6.760, Managua, at 1750-1815. YNDG, Leon, has now moved again and seems settled down around 5.935; noted often evenings (*EST*) with native music, announcing "Radio Colonial." YNHB, 6.550, heard 2310-2343 identifying as "Radio Panamericana en Managua, Nicaragua, Centro America." (Machwart, Mich.)

Nigeria—Radio Nigeria, Lagos, is now *testing* on 4.990 at 1145-1700; on 6.100 at 0000-1115; asks for reports. (Radio Sweden, others) Still heard on 7.255 to 1715A closedown; usually has African music last 15 minutes: signs with "God Save the Queen." Normally takes relay of BBC's GOS from 1500-1700; news 1500. (Pearce, England)

North Korea—The North Koreans reported on 6.235A and 4.400A are constantly on the move; are hard to keep up with; heard mornings (*EST*). (Rosenauer, Calif., others)

Pakistan—Radio Pakistan, 15.620, Dacca, noted with news 0330-0340, 0340-0400 in native, then talk in *English*, followed by recordings to closedown 0430. (Pearce, England) Heard on 15.325 with news 2130; on 7.010 with news 1530. (Sanderson, Australia)

Panama—HOLA, 9.505, Colon, heard ending *English* session; starting another *English* period 2100. (Baitzel, N. J.) HORT, 6.030, noted 0700; HOJA, 9.645, heard with music 1800; HOQQ can now be heard evenings (*EST*) on 6.140, noted 2045-2120 with native music. (Machwart, Mich.) Measured 6.139 recently at 1925; is in clear since TGJA moved. (Oskay, N. J.)

Peru—OAX4T, 9.560A, Lima, noted good level 0750 and closing down 0800. (Ferguson, N. C.) This one heard to 2308, fair level but in QRN. (Oestreich, Washington State) OAX4X, 15.105A, Lima, noted 1841 with identification "Transmitiendo Radio El Sol desde Lima, Peru;" continued with native music; OAX1A, 6.157, Chiclayo, noted 2340-0013; OAX4G, 6.091, Lima, heard 2200. (Machwart, Mich.) OAX4Z, *Radio Nacional del Peru*, 5.887, Lima, sent QSL card, in Spanish. (Patterson, Ga.)

Philippines — DZH7, 9.73, Manila, noted regularly 1000 in *English*. (Gaylord, Washington State) Heard 1630-1645 in *English*, then Russian. (Flynn, Calif.) Pearce, England, notes DZH8, 15.300, strong 1015; DZH7, 9.730, at 1120; and DZH9, 11.85A to closedown.

DZH3, 9.500, noted 0430 with musical session. (Sanderson, Australia)

Poland—Radio Warsaw noted with *English* for North America on 15.120 at 0715-0800. (Mast, N. Y., others) Announces other *English* periods for North America currently as 1700-1800, 11.740; 1930-2000, 9.570; 2315-2345, 0030-0100, 7.205. (Kary, Pa.)



WALDOM
SUPERIOR COMPONENTS
WALDOM CONES...R.M.A. warranty, true low frequency response, unconditionally guaranteed.

Waldom also supplies quality CRONAME parts



TV ANODE CONNECTORS



TUBE SOCKETS Standard and J.A.N. Types



KNOBS



INTERLOCK ASSY.

WRITE FOR FREE CATALOGS

WALDOM ELECTRONICS, INC.
911 N. Larrabee St., Chicago 10, Ill.

SUMMER SALE
PRICES SLASHED

T.V. TUBES—ROCK BOTTOM PRICES
In lots of 6 each No. only

6BG6	99c	6BQ6	74c
10BQ6	99c	6AQ5	49c
12AX7	99c	6CD6	$1.29
6CB6	99c	6S4	49c
6AK5	79c		

Westinghouse Bypass Rectifier 0.64 Amp. 28 Volts. Reg. $11.00 ea. Special! $1.99

12 BRAND NEW 10" PHONO RECORDS—Asst'd. Jazz—Popular, Rhythm—Blues. Please specify $1.79

Bingo Polo—10 Pos. 2 Gang Switch 29c

3 piece, 5 pole Male and Female separable Amphenol Plug, with Pins, shielded cable. Approx. 5 ft. long. 39c pair ..... 2 pr. for $1.00

Grind your own Crystals. Pure Brazilian Quartz. Various sizes and thicknesses. ½ lb. plus $1.00

4 Tube Drilled Chassis, 4½"x6½"x1½". 29c each

4 inch P.M. SPEAKER $1.50

5 in. 450 ohm Dynamic Speaker $1.39

Signal Corps Phones—2 M. Ohms (6 M. Ohms Both) $1.25

3 Ft. Ext. Cord (and Plug) 49c

TUBE TUBULAR ELECTROLYTICS

20-20 MFD. 150 V. 39c
30-30 MFD. 150 V. 97c
40-40 MFD. 150 V. 59c



Low-Loss Short Wave Lock Type Air Trimmer Variable Condensers
5 Pf.—20Mmfd. 14c
7 Pf.—25-30 Mmfd. 19c
8 Pf.—30-35 Mmfd. 19c
14 Pf.—56 Mmfd. 24c

3 GANG T.R.F. VARIABLE CONDENSERS .000365 Cm. 69c

D.P.D.T. TOGGLE SWITCH ..... SLIDE 19c

1,000 OHM WIRE WOUND POTENTIOMETER 19c
30 HY-FILTER CHOKE SHIELDED ..... 3 for $1.25

PIEZO CRYSTAL HOLDERS, 12 for $1.00—$6.00 per C

BCA Band Switches—
3 gang, 3 pos. 3 band 30c 6 gang, 4 pos. 4-5 band 40c

Trimmer-Padder Asst.—all isolantite—singles, dual, triples—100 asst. $2.25

Philco push button Heavy Switch, Double Pole 39c

ATTENTION, Prospectors, Explorers for Hidden Treasures! Construct a U.S. Army Type of Metallic Mine Detector Amplifier. Amplifier unit only less tubes and batteries with cables, headphone cord, and jack. Army wiring diagram. Type AN/PRS-1 ..... $1.95

RCA Asst'd Mica By-Pass Cond., .001, 100 for... 98c
5 for Song Pack Button Switch 49c

DRILLED CHASSIS FOR 5-6 tubes 5"x10"x1½" 29c
PHONE JACKS—INPUT & OUTPUT AUTO 14c
1946-1 RADIO VERNIER DIALS—6 in., 8¼ in. Rub. 39c
SALE—PHONO RECORD ALBUMS—12"—3 comp. 13c; 10"—3 comp.—15c; 4 comp. 20c; 12 comp. 49c

VULCAN HEAVY DUTY 100 WATT SOLDERING IRON. Built for U.S.N.—Brand New—Equiv. sells for $9.50 ..... OUR PRICE $2.99

MINIMUM ORDER $3.00—NO C.O.D.
SHIPMENTS—PLEASE INCLUDE POSTAGE
NEWARK SURPLUS MATERIALS CO.
Dept. J4
324 Plane Street NEWARK 1, N. J.



Pablo Acquerino, native musician, plays the one-stringed "Eng-Eng," which he constructed himself. His music is heard on the "Call of the Orient" broadcasts which originate over the facilities of the Far East Broadcasting Company in Manila, P. I.

Portugal — CSA38, 6.360, Lisbon, noted recently to 1900 sign-off; closed with clock striking and "A Portuguesa;" all-Portuguese. (Ferguson, N. C.)

Portuguese India — WRH reports *Radio Goa* now on the air 2030 (Sat. from 2130)-1230 on 3.529, 6.025, 9.610; news in Portuguese 0300, 0930.

Roumania — Radio Bucharest, 9.252A, has news now 1400 by man and woman; fair signal but with heavy QRN in South Africa. (Ridgeway)

South Africa—SABC has *experimental* transmissions in *English* over 15.230 on Tue., Thur. 0330-0715, and Sat. 0330-1045; over 11.937 on Tue., Thur., Sat. 1100-1505. (ISWC, London) Noted by Pearce, England, on 11.937 with news 1200; service in Afrikaans 1230-1330.

The South African noted from around 2300 on 4.945 is believed to be "Springbok Radio." (Patterson, Ga.) Heard identifying as such. (Stark, Texas) SABC, 4.895, Johannesburg, noted 0010 with setting-up exercises in Afrikaans. (McPhadden, Calif., others) SABC, 9.679A, noted 2345-0030A fade-out; news 0000. (Stark, Texas) Believed Johannesburg. Rosenauer, Calif., notes the SABC transmitter on 9.615 coming through from around 1000-1130.

Spain—Cadiz, 7.200, noted 1750 announcing "Radio Nacional de Espana" (may have been relay); signed off 1759 with march; fair level in N. C. Madrid, 15.526, noted with program in Spanish for Canary Islands 1145-1157; good level. (Ferguson) Madrid, 9.363, is coming through better now in Iowa with *English* to North America 1800-1840. (Lund) *Radio Juventud de Murcia*, 7.100, noted strong 1700 with call followed by light music. (Pearce, England)

Surinam—PZC, 15.405A, has *English* each Sat. 2030-2040. (Niblack, Ind.) Is parallel over PZH5, 5.752A. Noted by Winch, Calif., on 15.405A with music and Dutch announcements around 1930.

OUTSTANDING RADIO and ELECTRONIC BOOKS

BETTER THAN EVER
NEW 13TH EDITION

Practical radio engineers, technicians and advanced amateurs use this text to design, build and operate standard types of radio transmitting and receiving equipment, and for more complete reference data on operation of common vacuum tubes for all usages in all frequency ranges, and a wealth of other information. All in this single 734 page volume.



RADIO HANDBOOK

734 PAGES OF VITAL INFORMATION FOR EVERY PRACTICAL RADIO MAN, TECHNICIAN AND ADVANCED AMATEUR

CLOTHBOUND, GOLD STAMPED

$6.00 PER COPY (plus any tax)

RADIOTELEPHONE LICENSE MANUAL



Questions and answers on BASIC LAW, BASIC OPERATING PRACTICE, BASIC RADIOTELEPHONE and ADVANCED RADIOTELEPHONE. Typical study data necessary to prepare for any U.S.A. commercial radiotelephone license.

$3.75 PER COPY (plus any tax)

ALL-CONSTRUCTIONAL 12th EDITION RADIO HANDBOOK

Detailed information for practical construction of a wealth of radio communication equipment. All constructional—no theory.

$3.00 PER COPY (plus any tax)

ANTENNA MANUAL

A practical, comprehensive book on antennas. Over 300 easy to understand pages for everyone interested in transmission and reception.

$3.50 PER COPY (plus any tax)

BETTER TV RECEPTION
in fringe and low-signal areas

The standard guide for installation technicians and TV enthusiasts in the fringe areas. How to improve the picture and reduce interference.

$2.50 PER COPY (plus any tax)

WORLD'S RADIO TUBES
BRANS' VADE-MECUM
NEW 9TH EDITION

Characteristic data of over 15,000 tubes listed, from 253 manufacturers in U.S., Britain, France, Czechoslovakia, Germany, Russia, Australia, Hungary, Sweden, Japan, Denmark, Holland, Switzerland, Spain, Belgium, Argentina and others. Latest 1952 edition available in 16 languages.



$5.00 PER COPY (plus any tax)

SURPLUS RADIO CONVERSION MANUAL
IN TWO VOLUMES

This reference data has become standard for practical conversion of the most commonly used items of surplus electronic equipment. Write for list of items covered.

$2.50 FOR EITHER VOLUME (plus any tax)

BUY FROM YOUR DISTRIBUTOR
ADD 10% ON DIRECT MAIL ORDERS TO
EDITORS and ENGINEERS, Ltd. 1302 KENWOOD ROAD, SANTA BARBARA, CALIF.
Bookstore orders from BAKER AND TAYLOR CO. Hillside, New Jersey

MAKE THIS YOUR HOME FOR IMPORTANT WORK UNDER IDEAL CONDITIONS!

- TEST & INSPECTION ENGINEERS
- FIELD ENGINEERS
- ELECTRONIC ENGINEERS
- LAB. TECHNICIANS
- TV RECEIVER DESIGN ENGINEERS



NEEDED TO WORK ON Radar, G. C. A., Mobile Radio, Auto Radio, Airborne Communication & Navigation Equipment, Television, Antennas, Microwave Equipment, Servo Mechanisms and Guided Missiles.

YOU BENEFIT FROM high wages, a modern, air-conditioned plant, paid vacations and holidays, group insurance and a good chance for advancement.

Housing immediately available in the beautiful suburban and country areas that surround the Bendix Radio plant.

Write, Phone or Wire Mr. E. O. COLE, Dept. O

Bendix Radio

DIVISION OF BENDIX AVIATION CORPORATION
BALTIMORE 4, MARYLAND

INDISPENSABLE!

PHOTOFACT BOOKS



Photofact Television Course. Covers TV principles, operation and practice. 316 pages; profusely illustrated, 8½ x 11". Order **TV-1**.....Only **$3.00**

Television Antennas. New 2nd edition. Describes all TV antenna types; tells how to select, install, solve troubles. Saves time; helps you earn more. 200 pages; illustrated. Order **TAG-1**.....Only **$2.00**

Television Tube Location Guide. Volume 3. Accurate diagrams show position and function of all tubes in hundreds of TV sets; helps you diagnose trouble without removing chassis. 224 pages; pocket-size. Order **TBL-3**. Only **$2.00**

Television Tube Location Guide. Vol. 1. Over 200 pages of TV receiver tube position diagrams on hundreds of models. Order **TBL-1**.....Only **$1.50**

Making Money in TV Servicing. Tested proved methods of operating a profitable TV service business. Covers all important phases. Authoritative, valuable guide to success. Over 130 pages. Order **MM-1**.....Only **$1.25**

Servicing TV in the Customer's Home. Shows how to diagnose trouble using capacitor probe and VTVM. Short-cut methods help save time, earn more on outside service calls. Order **TC-1**.....Only **$1.50**

1949-1950 Record Changer Manual. Vol. 3. Covers 44 models made in 1949, including multi-speed changers and wire and tape recorders. Original data based on actual analysis of equipment. 286 pages, 8½ x 11", paper-bound. Order **CM-3**.....Only **$3.00**

1948-1949 Changer Manual. Vol. 2. Covers 45 models made in 1948-49. Paper bound. Order **CM-2**. Only **$4.95**

1947-1948 Changer Manual. Vol. 1. Covers 40 post-war models up to 1948. Order **CM-1**.....Only **$3.95**

Recording & Reproduction of Sound. 2nd Edition. New, completely revised and vastly enlarged edition of the outstanding original volume. The most authoritative treatment of all phases of recording and amplification ever written. Over 800 pages, 6 x 9". Order **RR-2**. Only **$7.95**



Audio Amplifiers. Vol. 3. Clear, uniform, accurate data on 50 important audio amplifiers, plus full coverage of 22 FM and AM tuners, produced during 1950. 362 pages, 8½ x 11". Order **AA-3**.....Only **$3.95**

Audio Amplifiers. Vol. 2. A complete analysis of 104 well-known audio amplifiers and 12 tuners made 1949-50. 368 pages, 8½ x 11". Order **AA-2**.....Only **$3.95**

Audio Amplifiers. Vol. 1. 102 amplifiers and FM tuners made through 1948. 352 p. Order **AA-1**....Only **$3.95**

Auto Radio Manual. Complete service data on more than 100 post-war auto radio models. Covers over 24 mfrs. 350 pages, 8½ x 11". Order **AR-1**.....Only **$4.95**

Communications Receiver Manual. Complete analysis of 50 popular communications models. 246 pages, 8½ x 11". Order **CR-1**.....Only **$3.00**

Radio Receiver Tube Placement Guide. Accurate diagrams show where to replace each tube in 5500 radio models, covering 1938-1947 receivers. 192 pages, pocket-size. Order **TP-1**.....Only **$1.25**

Dial Cord Stringing Guide. Vol. 2. Covers receivers made from 1947 through 1949. Shows you the one right way to string a dial cord in thousands of models. Pocket-size. Order **DC-2**.....Only **$1.00**

Dial Cord Guide. Vol. 1. Covers sets produced 1938 through 1946. Order **DC-1**.....Only **$1.00**

Order from your Parts Jobber or write direct to HOWARD W. SAMS & CO., INC. 2701 E. 46th St., Indianapolis 5, Indiana

HOWARD W. SAMS & CO., INC.

Sweden—Radio Sweden noted in *English* 2300-2315 on 11.705, 15.155; best on 11.705. (Leary, Calif.) Heard on 15.155 with news 1015; on 11.705 at 1805 tune-in when had *English*. (Niblack, Ind.)

Switzerland—Summer schedules for the monthly DX session from SBC, Berne, during the first week of the month, are—*To United Kingdom and Ireland*—Tuesday 1405, HEU3, 9.665; HER2, 6.055. *To North America*—Tuesday 2050, 2235, HER5, 6.165; HE13, 7.210; HER4, 9.535; HEU3, 9.665; HER5, 11.865. *To E. Australia and New Zealand*—Wednesday 0235, HER5, 11.865; HER6, 15.305; HER7, 17.784 (last two are beamed to W. Australia, Far East). *To Southern Asia and Japan*—Wednesday 0805, HER6, 15.305; HER5, 11.865; HER7, 17.784. *To India and Pakistan*—Wednesday 1005, HER5, 11.865; HER7, 17.784. *To South Africa*—Wednesday 1005, HER6, 15.305. *To Middle East*—Wednesday 1205, HER5, 11.865; HED7, 15.120.

Syria—Damascus, 11.913A, noted signing on 1530 in French; started *English* session 1630; was QRM'd by VOA at 1700A. (Ferguson, N. C.) Still closes 1730; noted with news 1716-1722. (Bellington, N. Y., others)

Tahiti—Radio Tahiti, 6.135, Papeete, has nice signal around 0000-0100. (Flynn, Calif.)

Taiwan—BEC26, 10.065A, heard 0915 with dance music; another day noted 0845 with music, news in Chinese 0900. (Pearce, England)

Tangier—Pan-American Radio noted near 7.300 with Spanish, French, *English* at sign-off 1800; the well-known "La Cucaracha" interval is now orchestral instead of music-box rendition as formerly. (*Short Wave News*, London)

Thailand—Bangkok, 6.24, noted with *English* identification now when signing off 1025; announces 6.240, 7.104, 11.910, and (probably) 15.910; the *English* session is heard on 6.240 as early as 0530 and concludes 0625; 7.104 is heard as early as 0530 also but is *not* parallel with 6.240; these channels do parallel from 0625, however, with native session. (Rosenauer, Calif.) Heard in New Jersey on *measured* 7.1062 with excellent signal 0640 in native, parallel 6.240, which was very weak. (Oskay)

Turkey—The (Sunday) Mailbag session is again noted 1845 over TAT, 9.515, in the North American beam. (Boice, Gates, Conn., others) Still has Spanish session for Latin America daily 1730-1800 on that channel. (Bellington, N. Y.)

In verifying, *Radio Ankara* listed available channels as TAN, 6.000; TAM, 7.240; TAP, 9.465; TAK, 11.760; TAQ, 15.195; TAD, 17.720—all 20 kw. TAS, 7.285; TAT, 9.515; TAU, 15.160, and TAV, 17.830—all 100 kw. (Mast, N. Y.)

Radio Izmir, 6.485, Smyrna, is on the air daily 0800-1500; call is "Burasi Izmir Radiosu." (Bluman, Israel, via WRH)

Uruguay—Radio Sweden says

SENSATIONAL VALUE!

#630 SUPER 30 TUBE CHASSIS
Mfr. Licensed under R. C. A. Patents
Easily Adapted to U. H. F.

Complete with 21" first quality tube AND Beautiful hand-rubbed Mahogany Console Cabinet. COMPLETE PRICE $259.95



slightly higher with full doors

the latest 1952 model with all the newest electronic improvements . . .
- peak sensitivity for fringe areas
- synchrolock tuning
- keyed A G C
- 15,000 volts under load
- 12-inch RCA speaker
- can be adapted to color & UHF
- high quality parts

A set—NOT A KIT

Completely wired, Factory Engineered, aligned and tested. RMA Guaranteed

1 YEAR GUARANTEE ON TUBE

A half-hour to mount; ready for operation. Saves up to $150.

Compare this anywhere for high quality—low price!

Write Dept. F for further information. Phone and mail orders filled on receipt of money order for 25% as deposit . . . the balance C.O.D., f.o.b. N. Y.

NEW ENGLAND TELEVISION CORP.
75 CHURCH STREET NEW YORK, N. Y.



RESISTOR KIT

100 Assorted Insulated ½, 1 and 2W Standard RMA Values (Not Surplus). Kit Contains 20 Values in 5%, 10%, 20% Tolerances **$3.00**

MINIATURE TUBE SOCKETS 7 pin wafer type, 25 for..... **$1.00**

FOCUS POTS 10K W.W. 4 WATT THREE FOR **$1.00**

T-V TUNERS—$4.75

Continuous Tuning Printed Circuit Type

All new units. Uses 6J6 tubes in very efficient Hi-Q circuit. Has eight tuned circuits with individual compensation. Built in 5:1 Vernier Drive. Can be readily converted to a Hi-Gain, Low Noise booster. Schematic and instructions furnished. Shipped less tubes.



WITH TUBES $6.75

Television receiving tubes—latest types in stock at "terrific discounts." Write for price list.

WRITE FOR CATALOGUE
POSTAGE PAID CASH WITH ORDER

FRANK W. DE CRAY
AND ASSOCIATES
1261 W. JEFFERSON BLVD. CULVER CITY, CALIF.

SCHEMATICS—CONVERSIONS
FOR SURPLUS GEAR

NEW LIST! MANY ADDITIONS!

Send stamped, self addressed envelope for List S. Add 25¢ for chart explaining AN nomenclature.

R. E. GOODHEART BOX 1220 BEVERLY HILLS, CAL.

CXA19, 11.835, Montevideo, now broadcasts news in *English* 1715.

UBI (Indonesia)—*Radio Angkatan Udara*, 11.940, Djakarta, is on the air daily 0430-0630 but remains 0700-0730 on Fri., Sat. (Radio Sweden) Opens with "Repaz Band March." (Sanderson, Australia) YDP, 4.930, Medan, Sumatra, noted closing 1130. (Catch, England)

USSR—*Radio Moscow* noted with news 2100 on 7.200, 7.245A. (Tonsi, Wisc.) Moscow, 11.75, noted signing on 2100 in Home Service; still heard 2230, fair to good level; noted on 9.66 in parallel with 9.545, 6.11, 6.05 to China 0400; on 11.88 with news 0000, fair level. (Balbi, Calif.)

Alma Ata is radiating on 9.340 and 9.380 in parallel 1915-2130, 2300-1100. (WRH) Khabarovsk, 6.02, noted parallel Soviet on 7.18 at 0027 with setting-up exercises. (Bellington, N. Y.) *Radio Tashkent*, 6.825, noted with *English* to India-Pakistan 1000-1030, 1115-1130. (O'Sullivan, England) *Malmo DX-aren*, Sweden, lists this one also on 7.710, and says *Radio Erevan*, 7.150, Armenia, is heard 1100-1300.

Flanagan, N. Y., lists summer schedules for *English* broadcasts from *Radio Moscow* as (to North America) 0800-0830, 17.83, 15.12, 11.96, 11.91; 1820-1930, 15.23, 15.155, 9.7, 9.67, 9.57, 9.55, 7.24, 7.20; 1930-2030, 15.23, 15.11, 9.67, 7.24, 7.20; 2030-2300, 15.23, 15.11, 9.7, 9.67, 9.57, 9.55, 7.24, 7.20; 2300-0100 (for Pacific Coast), 11.88, 9.56, 7.24, 7.20.

Vatican—*Vatican Radio* broadcasts in *English* daily 1000 on 9.646, 11.740, 15.120; 1315 daily on 5.968A, 9.646, 11.740; Tue. *only* 1030 on 11.740, 17.840 (to India, Ceylon, South Africa). (Boice, Conn.) Pearce, England, recently noted *Vatican Radio* on 7.270 with interval signal 1500, followed by call and talk in Spanish.

Venezuela—YVQV, "La Voz de Los Pueblos," *Radio Carupano*, is a *new* station heard on 3.320 relaying YVQP, m.w., and signing off 2200. (Radio Sweden) YVMO, 4.989, Barquisimeto, noted 1810 with music, good level in Britain. (Catch) Noted back on *measured* 4.990 at 0600 recently. YVKM is currently back on 5.0293, heard 0608. (Oskay, N. J.)

Yugoslavia—*Radio Yugoslavia*, Belgrade, is now scheduled on five channels using 10 kw. each, but by this time may have started operation of its projected 100 kw. outlet. Schedule includes *English* 0215-0230, 11.895; 1130-1145, 7.240; 1400-1415, 7.200. French 0200-0215, 11.895; 1345-1400, 7.200; 1700-1715, 1800-1815, 6.100. Spanish 0130-0200, 11.895; 1500-1530, 6.100; 1815-1845, 6.255. (WRH)

• • •

Press Time Flashes

The Commercial Service of *Radio Goa*, Portuguese India, has been heard by Pearce, England, on 17.900A around 0315 with "Listeners' Request" session; gave schedule as 0300-0430 for this session; also reported by Cushen, N. Z., closing 0430.

Newspaper dispatches some weeks

ORDER BY MAIL FROM
WHOLESALE RADIO
Low Prices • Complete Stocks • Fast Shipments

No More Monkeying Around . . . Flick of Switch Clears Picture Instantly
SNYDER'S AMAZING NEW DIRECTRONIC
360° INDOOR TV AERIAL
Gives Same Clear Picture As Expensive Rotator Systems!


5.95 COMPLETE Nothing else to buy!
Stick it up anywhere. Anyone can install. Adheres to any surface—ceiling, attic, closet, etc. All channels. Electronically switch beamed to cover entire 360° area. No more turning antenna . . . flick of switch clears picture. Order model ID303. You get: antenna, 20 ft. lead-in, Directronic switch, everything down to the last thumbtack.

VIBRATOR BARGAIN!
Universal NON-SYNC VIBRATOR 6 V., 4 Prong
Special 1.59
Replaces Radiart 3300, 3301, 83269, 834288, Delco 7239124, Mallory 850, 4-4, 254, Philco 53-0025, 53-0028, 413367, Motorola 3233, 6A A 3233, 6A K 11005, Tru-tone 19435, Zenith 190-26. Can size — 1¼" di. x 2⅞". Model 51.

SAVE ON THIS SENSATIONAL
JUNE SPECIAL
Reg. $4.95 CONICAL ARRAY
Special For June 3.95
lots of 4 2.95
Complete TV-FM band. Can be used with any type lead-in 72-300 ohms. Hi-tensile 'lp' aluminum alloy elements. Mast clamp for poles up to 1¼" di. inc. Never before at this low price. Snyder model AA-44.

Save! Stock Up Now!
SPEAKER SALE
ALL ALNICO 5 PM

Square:		Round:	
3"	1.69	5"	1.89
4"	1.89	6"	2.10
Oval:		8"	3.10
4 x 6	2.39	10"	4.09
5 x 7	2.96	12"	5.39
6 x 9	3.29		

For FRINGE AREA! Sharp Pictures In Any Direction
Snyder's Directronic
360° MOTORLESS TV AERIAL
Same Clear Pix As Motor Rotating Aerial Systems

COMPLETE with three 3½ ft. masts, 75 ft. 3 cond. cable, beam selector sw., guy rings and mtg. base. 18.95 TX 595
Flick of switch clears picture instantly. Electronically beams 360° Choose direction with Directronic selector switch mounted on or near TV. Complete double stacked array with 18 bi-toggle aluminum alloy elements. Model AE-6060. Specify channels. Mast, guy ring and mtg. base $18.95

TV ANTENNA ACCESSORIES! Everything You Need Low Priced!
STEEL EXTENSION POLES. Weather treated. 10 ft. long 1¼" di. 2.10
5 ft. long 1¼" di. Crimped end 1.35
3½ ft. long 1¼" di. Crimped end 1.10
CHIMNEY MOUNT BRACKETS CM-100 Complete with strap ..... Pr. 1.59
HEAVY DUTY MAST BRACKETS MB-2 Adj. to 18" from wall 3.75
ANTENNA SWIVEL BASE. Aluminum Fits 1¼" O.D. mast section. ..... .39
300 OHM TWIN LEAD—Per ft.—21¢; 100 ft. 17.50
DOUBLE POLE DOUBLE THROW KNIFE SWITCH ..... .45
ANTENNA WALL MOUNTS PAM-3 For poles 1"-1¼" di. 6" from mast to wall 1.19
PAM-4 For poles 1"-1¼" di. Up to 18½" from wall 1.69
PAM-6 For poles 54"-1¼" di. Adj. 1" to 18" from wall 3.45
Address Orders to Dept. RN-6. Write for FREE F.Y.I. Bulletin.

WHOLESALE RADIO PARTS CO., Inc.
311 W. BALTIMORE ST., BALTIMORE 1, MD.

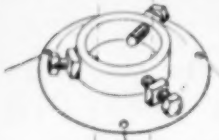
RADIO and TELEVISION ELECTRONICS
RCA
in all Technical Phases
Now Classes (Day and Evening) Start 1st of Dec., Mar., June, Sept.
Free Placement Service for Graduates
For Free Catalog write Dept. RN-52
RCA INSTITUTES, INC.
A Service of Radio Corporation of America
350 WEST 4th ST. NEW YORK 14, N. Y.

SPEAKER RECONING
Complete line Cones, Spiders, Rings and Voice Coils. Custom Built Voice Coils. Low prices. Write for Parts List and Reconing information.
WESTERN ELECTRONICS CO.
3164 West Colfax Denver 4, Colo.

MARK THESE VALUES!
TOP STANDARD BRANDS ONLY—100% GUARANTEED
RCA—GE—SYLVANIA—HYTRON—PHILCO—KENRAD—NU-TUNGSOL—WESTINGHOUSE—WESTERN ELECTRIC
1B3GT .....89c 6AG5 .....79c 5U4 .....59c 6J6 .....89c 12AT7 .....99c
SELL US YOUR IDLE TUBES AND SURPLUS
CASH WAITING—TOP PRICES PAID
1625RCA .... 38c 50C5RCA ... 59c
Write for Your Free Bargain List Now!
MARK electronics

1952 Randolph Ave. New York 72, N. Y.

South River NEWS



GUY RING Model GR-1

Constructed of heavy gauge, galvanized steel, embossed for extra strength. Set screw arrangement provides positive fit for all masts ranging from 1 ¼" O.D. to 2" O.D. Complete with installation hardware.

Smooth Round Edged Holes Prevent Cutting of Guy Wire

South River Antenna Mounting Accessories are carried by every leading TV Parts Jobber from coast to coast.

New catalog mailed to all Dealers and Service Men. Write, if you haven't received yours!

SOUTH RIVER METAL PRODUCTS CO., INC.
South River, N. J.

PIONEER AND OUTSTANDING PRODUCER OF TIE-LINE AND ANTENNA MOUNTS

RADIO Surplus Buys



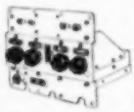
500 KC CRYSTALS

500 KC Crystals in FT 241-A holders with ½" pin spc.

ONLY LIMITED QUANTITY AVAILABLE

$1.95 ea.

TUNER FROM NAVY "BN" EQUIPMENT

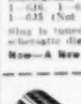


Simply modified into 2 meter converter for car or communications receiver. Uses 1—6J6, 1—6BH7, 1—6986, 1—6J5 (Not Furnished).

Slug is tuned from 137 to 187 Megacycles. Includes schematic diagram for "BN" equipment.

Now—A New LOW Price **$4.95**

SENSITIVE ALTIMETERS



Pioneer Sensitive Altimeters. Range 0-35,000 ft., calibrated in 100's of feet. Barometric setting adjustment. No hook up required . . . mounts easily in auto or aircraft. Used. Good. Each ..... **$12.95** Postpaid

ALTIMETER, AIRCRAFT



U. S. Navy surplus Altimeters, range 0-10,000 feet. Adjusts to sea level setting of terrain. Simply installed, requires no hook up . . . for auto or aircraft installation.

BRAND NEW ..... Each **$7.95** Postpaid

ALL EQUIPMENT F.O.B. PASADENA UNLESS OTHERWISE SPECIFIED. PLEASE ENCLOSE FULL AMOUNT WITH ORDER

C & H SALES CO.

BOX 356-JT, East Pasadena Station, Pasadena 8, Calif.

ago indicated that *Vatican Radio* soon would double power. (Gay, Calif.)

Indonesia is to replace transmitters at Surakarta, Medan, Jogjakarta, and Djakarta with higher-powered jobs shortly. (ISWC, London)

Cushen, N. Z., reports an unidentified station on 3.720 at 1300-1400 fadeout; says at 1300-1315 is in *English*; he believes it may be located in the Near East. A Swede believes this to be a Greek Armed Forces Station which parallels 6.340.

PRL7, 9.720, Rio de Janeiro, was heard recently at 2045 in *English* with a program "from the Midnight Room of the Copabana Palace Hotel;" followed with airline commercial announcement. (Robertson, Mass.)

AAH, Seattle, Washington, Alaskan Communications System, heard testing on 11.995A at 2015; good level in N. C. (Ferguson) Is noted some Sundays testing around 1100-1200A.

Paris lists overseas programs as to Antilles, Guyane, St. Pierre and Miquelon, 1830-2030, 9.560, 9.675. To Madagascar, Comores, Cote Francaise des Somalis, Reunion, 2300-2330, 11.845. To Tahiti, Iles Marquises, 0030-0130, 9.550, 17.850. To Fr. West Africa and Fr. Equatorial Africa, 0145-0245, 17.850, 15.240. To New Caledonia, New Hebrides, 0245-0315, 17.850, 15.240. To Antilles, Guyane, St. Pierre and Miquelon, 0530-0600, 17.850. To Indo-China, 0815-0830, 17.850, 15.400. To Madagascar, Comores, Cote Francaise des Somalis, Reunion, 1115-1215, 17.850, 15.350, 11.845. To Fr. West Africa and Fr. Equatorial Africa, 1500-1630, 11.700, 15.240, 9.540. To Indo-China, 1730-1800, 9.680. All transmitters in the Overseas Service are listed 100 kw. (Bishop, Ohio)

Radio Pakistan has been noted with *test* program to Indonesia 0630-0715 on 17.835, 15.270 (announced); had all-native music, songs. (Pearce, England) *Radio Algerie*, Algiers, broadcasts on 6.145 at 1330-1500 in Kabyle on Mon., Thur., Sat., and in Arabic other days; in French on 7.280 daily at 1500-1800. (Radio Sweden)

In a letter direct from Radio Tokyo, current schedules were listed—To North America, JOB, 6.069, 0000-0100; to North China, JOB, 6.069, and JOA, 7.180, 0600-0700; to Central China, JOB, 6.069, and JOA, 7.180, 0700-0800; to Philippines and Indonesia, JOB-2, 11.705, and JOA-2, 9.675, 0900-1000; and to India, JOB-2, 11.705 ,and JOA-2, 9.675, 1030-1130. However, West Coast DX-ers were hearing the 0000-0100 North American beam on 11.705 regularly; may be "alternating" between 6.069 and 9.675 in parallel with 11.705 for this transmission for "test" purposes. (Worley, Balbi, Rosenauer, Calif., others)

Saylor, Virginia, reports a *new* outlet in Brazil heard irregularly evenings (*EST*) on 5.597AV; announces as *Sao Francisco* and may not be on daily.

Verification from HOLA, 9.505, Colon, Panama, lists *English* for 0900-1100, 1600-1800, 2100-2200. (Saylor, Va.)

NEW TUBES GUARANTEED

6A2	$1.25	3C33		$41.95	6Y3Z		$12.95
6B2	1.50	3BP1		9.95	VT52	4-65A	4.95
6B3	V4/90	1.50	3DP1		3.95	6660	1641	2.25
6A3	V6/75	1.15	3E29		12.95	6Q6T		1.75
6C5	V6/105	1.15	4C35		37.50	6S7		1.10
6D3	V6/150	1.00				10GTH		4.50
1A3						6K17Z		3.50
1B22		3.50				250B		6.95
1B24		3.50				304TH		6.95
1B26		6.50				304TL		6.95
1B27		2.75				304TL		6.95
1B32		1.75				We Pay	807A	84/75
1B35		2.95				Highest	327A	
1B37		12.50				Prices!	327A	
1B38		12.50					393A	
1B57		14.50					393A	
1B42		12.50					393A	
1N21B			4B27		$13.50		417A	
1N22		1.95	4B150A		35.00		446A	
1N23B		1.25	5BP1		4.50		446A	
1N23C		1.50	5BP4		3.95		707B	
1N23E		3.50	5BP4		3.95		707B	
1N34A		1.50	5CP1		4.50		713A	
1N43		1.40	5DP1		4.50		713A	
1N48		1.75	5FP7		4.50		715A	
1N60		3.75	6A8G		3.50		715B	
2B31		4.50	6AF6G		4.50		721A	
2C21	1642		6C21		16.95		721A	
2C22		29.50	6C22		16.95		723A/B	
2C40		6.50	12BP7		16.95		723A/B	
2C43		39.50	12DQ6		4.50		800	
2C51		3.50	12DT7		3.50		801	
2D21		1.40	5BP7		3.95		801	
2D21A		1.40	5CP7		4.50		801	
2E26		3.00					813	
2E29		29.50					832A	
2AP1		10.95					832A	
2BP1		4.95					832A	
2X2A		1.50	80-15		9.95		833A	
3B28		1.50	80-30		11.95		836	
3C45		9.95	80-50		13.90		861	
3D21	249	1.75					861	

Vacuum Capacitors

Complete Line of Transmitting & Receiving Tubes. Send Cash With Order and Save C.O.D. Charges!

J. S. H. SALES CO.

Dept. R-13, 7552 Melrose Ave., Los Angeles 46, Calif.

LOOKING for Sensitive Plate Relays??

SIGMA 4A, 2000 ohm 2 ma plugin sealed SPDT	$3.45
SIGMA 4R, 8000 ohm 1 ma plugin dust cover	3.75
SIGMA 61F, 8000 ohm .04 watt high AC sens.	3.75
SIGMA 5AH, 130 ohm 15 ma 2-24 volt coord.	3.95
SIGMA 5F, 130 ohm dual coils 2-24 volt 15ma.	4.25
KURMAN RK-35, 10,000 ohm 1/2 ma super-sensi.	4.95
G.E. 7,000 ohm 6 ma, 3PDT	4.95
G.E. CR2791, 10,000 ohm 9 ma, 3PDT	4.95
GM Labs, 200 ohm dual 6-12-24 volt 4PDT	3.95
ALLIED B012D35, 200 ohm 24 volt 4PDT	3.98
ALLIED DC0D28, 42 ohm 6 volt 3PDT	3.75
ALLIED D09, 10,000 ohm 15 ma 3PDT	3.75
GUARDIAN SERIES 100 A.C. 115 volt 4PNO	3.75
GUARDIAN SERIES 150 A.C. 115 volt 2PNO	3.75
ROTARY RELAY 14 volt for operation remote	1.95
ALLIED BNY-1, 200 ohm 24 volt 6PDT 15 amp	4.75
MINIATURE P.W.B. SELENIUM RECT. suitable instrument or DC relay rect. 115 AC line operation	.89
ESCAPEMENT TYPE MECHANICAL TIMER, 6PS amp. 10 sec-24 min.	1.39
HAND DRIVE GENERATOR, 115V/200 ma, 6.3V/3A, suitable for use as megger, couple 2 for HI POWER portable supply, a buy	9.95
W.E. VARISTOR, type D-164567	1.15
LINK POLICE BAND 5 tube AUTO RADIO, used cond. w/6 volt supply motor or vibrator, suitable as is or with VHF converter, simple change to make excellent band receiver. 2-1 mc	8.95
24V CHARGED PLASTIC CASE STORAGE BATTERIES 6 V 40 amp. $4.95, 4 V 40 amp. $3.95, 2 V 20 amp. $1.99, 9 volt HOT SHOT BATTERY	.75
ESSICO 100 watt 24 V A.C.-D.C. SOLDER IRON, ideal for prod. bench work use 24 V transf. or 5 in series on 115 V line	1.95
JOHNSON KW RF CHOKE 1.0 mh 500 ma	.75
RCA 8-25,000 OUTPUT TRANSF. #TR-69/1027 NEW SPARE PART	1.65
KLIXON PER THERMAL RELAY 110/220 VAC	.95
POWER TRANSF. 400 ct. pri 0-80-115, 6.3 2.5A, 6.3 6A, 2.5V 2A HV 820 CT 250 ma	4.75
KIT, RELAYS, all good new coil types 5	1.00

PURCHASE BONUS: 2 lb. hookup wire kit free on $2.00

ELECTRONIC SPECIALTY SUPPLY CO.

56 E. Lispenard Street New York 13, N. Y.

Citizen Band Transmitters and Receivers

Wilcox CW3 Receivers Used

Technical Radio Co. CW Transmitters 1500kc-12000kc with V.F.O. and power supply.

THOUSANDS OF GENUINE PHILCO RADIO AND TELEVISION PARTS

F. M. antennas with 50 foot of lead in wire. $2.00 Three inch P.M. speaker. 90c

CITIZEN BAND TRANSMITTERS AND RECEIVERS

420-450 MEGACYCLE TEST OSCILLATORS

FOR AMATEUR BAND USE

SPERA ELECTRONICS LABS.

37-10 Thirty-third St. Long Island City, N. Y.

RADIO ENGINEERING DEGREE IN 27 MONTHS

Radio engineering is a big field. There's room for you in it—if you're good. Get first class training at Indiana Tech. Intensive, specialized courses, including strong basis in mathematics and electrical engineering, advanced radio theory and design, television, electronics, Modern laboratories. Low rate. Also B.S. DEGREE IN 27 MONTHS in Aeronautical, Chemical, Civil, Electrical and Mechanical Engineering. G.I. Gov't approved. Enter June, Sept., Dec., March. You can earn part of your expenses right here in Fort Wayne while you are studying.

INDIANA TECHNICAL COLLEGE

982 E. Washington Blvd., Fort Wayne 2, Indiana

Please send me free information on B.S. Engineering Degree in 27 months as checked.

☐ Radio-Television ☐ Aeronautical
☐ Civil ☐ Mechanical ☐ Electrical

Name .....

Address .....

Hamburg now operates on two *new* channels beamed to Southeastern Europe—6.270 at 2300-0600; on 9.735 at 1100-1900. *Radio France-Asie*, Saigon, Indo-China, now *tests* on 15.430 at 1035-1100 in French, *English;* asks for reports. (Radio Sweden)

Catch, England, flashes s u m m e r schedules in *English* for Paris are daily 0315 on 7.240, 6.145; daily 1345 on 6.200; daily 1500-1600 on 6.200; Mailbag program is Wed., Sat., during the 1500-1600 transmission.

Radio A.E.F., Brazzaville, French Equatorial Africa, is now scheduled 0630-0815, 6.025, 9.570, 17.840; 1230-1505, 6.025, 9.970, 15.595. (Bluman, Israel, via WRH)

At press time, WRH reported that the Community of the German Broadcasting System has decided to begin an International Short-Wave Service in about two months. It is planned to radiate at first only five programs in German directed to German listeners throughout the world. This Overseas Service is being arranged by Nordwestdeutscher Rundfunk, Hamburg, and is to be transmitted by *all* German short-wave stations (presumably "all" refers to Western Zone.—K.R.B.).

At press time, the short-wave transmitters aboard the *Courier* were being heard at good level throughout the United States, testing on (*announced*) KU2XAJ, 6.110, 9.690 (and 1510 kc. m. w.) on a schedule of 1700-2300, with announcements in Spanish and *English*; location was given as Canal Zone waters, and reception reports were requested to P.O. Box 2016, Balboa, Panama Canal Zone.

* * *

Acknowledgement

Many thanks for the fine reports. Please keep them coming to Kenneth R. Boord, 948 Stewartstown Road, Morgantown, West Virginia, USA. . . . . K.R.B.

DELIVERIES SPEEDED

HESS BROTHERS of Allentown, Pa. has put into operation a two-way radio communications system linking the store directly with its fleet of more than 30 delivery and service trucks and cars at all times.

Station KGC209 is the first radio communications station to be licensed in the U. S. for the exclusive use of a department store. The station is authorized to operate on a 24-hour-a-day basis on a frequency of 35.94 mc.

In addition to expediting deliveries in the store's 60-mile radius trading area, the new installation is expected to effect substantial savings in the consumption of gas, oil, and tires. The company also anticipates a reduction in the number of packages which are undeliverable because of errors in addresses, etc., as such errors can be queried by the driver and corrections made without having to return the delivery to the store for correction and re-routing. This should also result in a saving of time.

—30—





KLIPZON

The VERSATILE CRYSTAL PROBE

Bring your VTVM and VOM up-to-date by using KLIPZON TYPE V or C CRYSTAL PROBE.

Get VHF performance from your regular instruments.

Well-known SELF-HOLDING POINT gives added convenience in testing.

There are many testing advantages with KLIPZON PROBES

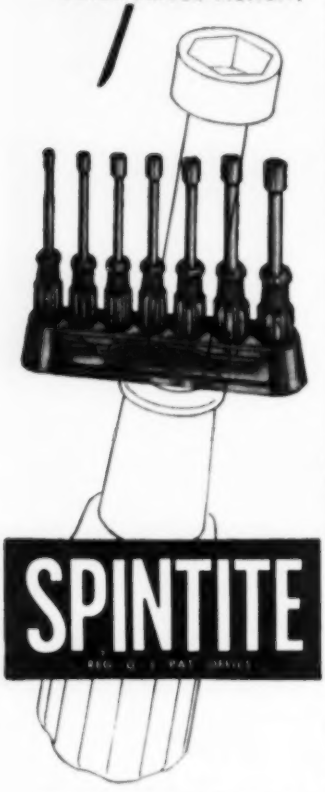
Here are some of the things you can do!

- **Measures VHF up to 200 M.C., with minimum loading and de-tuning; allows you to check gain per stage throughout receiver.**
- **Check the operation of oscillator tube by holding probe nearby.**
- **Gives a rough check of Q for quick determination of coil merit.**
- **Makes "one man" antenna directional orientation easy; no phasing or shouting.**
- **Use with ordinary low frequency oscilloscope, to SEE audio or Video Modulation, of VHF signal.**
- **Use with regular oscilloscope for stage-by-stage alignment of TV receiver.**

Write for folder #24 which fully describes these tests and others.
Ask to see KLIPZON PROBES and other products at your regular distributor.

UNITED TECHNICAL LABORATORIES
MORRISTOWN, N. J.
ENGINEERS and MANUFACTURERS
ELECTRONIC SPECIALTIES

THE *Original* WRENCH WITH THE SCREWDRIVER ACTION!



SPINTITE

120 STYLES and SIZES

for

- ASSEMBLY WORK
- REPAIR WORK
- RADIO
- TELEVISION
- INDUSTRIAL
- AIRCRAFT

WALDEN WORCESTER

STEVENS WALDEN, Inc.
WORCESTER 4, MASS.

Technical BOOKS

"SIMPLIFIED RADIO SERVICING BY COMPARISON METHOD" by M. N. Beitman. Published by *Supreme Publications*, Chicago. 92 pages. Paper bound.

This is a simple and practical approach to the problem of servicing radio receivers. The beginner will find this manual as understandable as the technician with experience. The author has not assumed previous knowledge of the subject of radio and has launched his discussion with the most elementary principles regarding electricity, components, the use of circuit diagrams, vacuum tube operation, etc. A radio tube characteristic chart has been included so that this data is at hand and other reference books are not required. After a brief discussion on how a radio operates, and an outline of some of the possible circuit faults that develop in receiver circuits, the author discusses the comparison method of receiver servicing.

Various types of AM and FM radio receiver circuits are covered along with circuit diagrams and instructions on how such circuits are to be serviced.

* * *

"THE RADIO AMATEUR'S HANDBOOK" by the ARRL Staff. Published by *The American Radio Relay League*, West Hartford, Conn. Twenty-ninth Edition (1952), 784 pages. Price $3.00. Paper bound.

The ham fraternity will welcome this newly-revised edition of the "Handbook" which has been brought up-to-date and contains a wealth of practical material.

Like its predecessors, the emphasis is on the practical aspects of ham radio. Four chapters are devoted to the history of amatuer radio, electrical laws and circuits, vacuum tube principles, and data on high-frequency communications. The balance of the book is devoted to a discussion of high-frequency transmitters and receivers, power supplies, auxiliary ham equipment, antennas, operating techniques and procedures, etc. The text material contains information of interest to hams of all classes from the "Novice" through "Amateur Extra."

The tube data, which has always formed an important section of this manual, has been brought up-to-date and is presented in the most concise and compact manner possible.

A large catalogue section and a 13-page topical index complete the book.

* * *

"MUSICAL ENGINEERING" by Harry F. Olson. Published by *McGraw-Hill Book Company*, New York. 357 pages. Price $6.50.

To quote the subtitle of this book, this is "an engineering treatment of the interrelated subjects of speech, music, musical instruments, acoustics, sound reproduction, and hearing."

The text has been prepared with a

TELEPHONE EQUIPMENT & PARTS

Reconditioned and tested Army EE8 Field Telephones	Each	$22.00
Reconditioned upright Desk Telephones (for intercom-extensions, etc.)	Each	2.95
Solid Telephone Handsets, like new with 3 conductor cords	Each	4.95
New T-5-9 Handsets with flip switch and 3 conductor cords	Each	6.50
Reconditioned T-5-9 Handsets with new handset and flip switch	Each	4.95
New C-114 Loading Coils	Each	1.00
New S.M. 29A Remote Control units with canvas carrying bags	Each	15.50
New Connecting Transmitter & Receiver units interchangeable with Western Electric HA1 & F1 elements	Each	1.00
New Western Electric 3A Varistors	Each	.75
Reconditioned W.E. 202 Desk Telephones dial blanked with nine 2 finger lets, complete	Per Set	13.00

Terms: Check with Order—F.O.B. Brooklyn, New York

EASTERN TELEPHONE CO.
321 Vanderbilt Ave. Brooklyn 5, N. Y.

OLSON HAS BIG, BIG BARGAINS

FREE OLSON'S BIG BARGAIN BOOK

Get Olson's LOWER-than-wholesale prices from this famous book. STANDARD BRANDS—FRESH STOCK. Immediate delivery. Send for your copy today and buy your radio parts the right way—from OLSON.



SEE OLSON'S BIG ADS ON PAGES 86 & 87

OLSON RADIO WAREHOUSE
272 S. Market St. Akron 8, Ohio

Unused
ELECTRONIC COMPONENTS

39 pieces BC-957-A RADAR INDICATOR
22 pieces TA-12B TRANSMITTER
24 pieces RA-10-DB RECEIVER
32 pieces BC-603-D INTERPHONE AMPLIFIER

PLUS

Large stock of AN connectors in most sizes . . . big assortment electronic components, plugs, resistors, condensers, potentiometers and other parts.

★

Available for inspection at our Baltimore warehouse

★

COMMERCIAL SURPLUS SALES CO.
4101 Curtis Avenue
Baltimore 26, Maryland
TELEPHONE: CURTIS 3300

CODE SENDING RECEIVING SPEED

HIGH SPEED WITHOUT NERVOUS TENSION

REVEALING BOOK shows how "Pros" in operators develop high speed and proficiency. Learn code for Amateur or Commercial Radiotelegraph License, or improve your sending and receiving with the Candler System which develops radio telegraph experts and code champions.





CANDLER SYSTEM CO.
Box 928, Dept. F-G, Denver, Colo.
FREE BOOK

rather diversified audience in mind, ranging from the music teacher, the advanced musician, the musically-inclined layman, and the sound reproduction enthusiast to the engineer whose work is closely allied with the musical fields.

The book is divided into nine chapters which cover: sound waves; musical terminology; musical scales; resonators and radiators; musical instruments; characteristics of musical instruments; the properties of music; theater, studio, and room acoustics; and sound-reproducing systems.

This definitive work should find an enthusiastic audience among audio engineers and those whose vocation or avocation is the reproduction of music.

* * *

"MANDL'S TELEVISION SERVICING" by Matthew Mandl. Published by *The Macmillan Company*, New York. 417 pages. Price $5.50.

This is a practical how-to-do-it book for the radio technician entering the television field for the first time, or for the old timers in the TV game who want to brush up on the newest circuits and servicing techniques.

From long experience both in teaching and practicing television servicing, the author has arranged the text material for maximum utility. The first two sections of the book deal with television receiver fundamentals which apply to the various systems, the third section explains how circuit troubles can be localized, while the balance of the book deals with the specific service fault encountered. There are chapters on the picture tube and associated components; the r.f. mixer-oscillator stages; the sound section; the video i.f., video amplifiers, video detector, and d.c. restorer; the sync separator stages; the vertical sweep system; the horizontal sweep system; the power supplies; repairing and improving the antenna system; projection television; and v.h.f.-u.h.f. servicing problems.

A separate section on test equipment and color receivers concludes the book. The appendix contains a listing of TV station frequencies, the TV transmission pulse standard, the frequency spectrum, and data on typical TV picture tubes.

This book should prove of value to the TV technician when confronted by those elusive and time-consuming service faults.

—30—



"Darling, maybe we'd better call one of those 'gyp-artists' after all."

Tube Prices SMASHED!



Dependable performance and economical service are two outstanding features overshadowing even these sensationally low-low priced, high quality, fully guaranteed tubes. Every tube must pass rigid tests in our plant. You can compare RAD-TEL tube performance and quality with any standard tube anywhere.

80% to 90% off list!

All Tubes Individually Boxed! Same Day Service!

Check this list for Fully Guaranteed Tubes

Type	Price	Type	Price	Type	Price	Type	Price	Type	Price	Type	Price
083	.98	3S4	.46	6BC5	.44	6SJ7GT	.41	12SJ7	.43
1A5GT	.48	3V4	.47	6BD5GT	.39	6SK7GT	.41	12SK7GT	.48
1A6	.39	5AZ4	.39	6BE6	.39	6SL7GT	.48	12SL7GT	.47
1A7GT	.47	5U4G	.40	6BF5	.41	6SN7GT	.53	12SN7GT	.53
1AB5	.39	5V4G	.54	6BF6	.37	6SQ7GT	.37	12SQ7GT	.44
1B3GT	.49	5Z4	.40	6BG6G	.94	6T8	.56	12SR7	.49
1B5	.39	5Y3GT	.33	6BH6	.44	6U5	.44	14A6	.40
1B7GT	.59	5Y3G	.33	6BJ6	.39	6V6GT	.44	19BG6G	.93
1C5GT	.43	5Y4G	.35	6BL7GT	.59	6W4GT	.44	19T8	.79
1E7GT	1.09	5Z3	.39	6BQ6GT	.59	6W6GT	.44	25BQ6GT	.62
1H5GT	.40	6A3	.59	6BQ7GT	.72	6X4	.37	25L6GT	.39
1L4	.46	6A7	.59	6C4	.37	6X5GT	.37	25Z3	.40
1L6	.43	6A8	.50	6C5GT	.39	6T8G	.48	25Z6GT	.37
1LC5	.51	6AB4	.44	6CB6	.44	7A4	.47	32L7	.83
1N5	.46	6AQ5	.43	6CD6G	1.11	7A7	.48	35B5	.80
1P5	.57	6AJ5	.90	6E5	.48	7AF7	.53	35C5	.39
1Q5GT	.49	6AK5	.75	6F5GT	.39	7B4	.44	35L6GT	.41
1R5	.45	6AL5	.38	6F6G	.39	7C6	.40	35W4	.37
1S5	.39	6AQ5	.39	6F8G	.37	7F7	.59	35Z4	.37
1T4	.45	6AQ6	.37	6G6G	.53	7Y4	.39	35Z5GT	.37
1T5	.53	6AR5	.37	6H6GT	.41	7X7	.49	41	.43
1U4	.45	6AS5	.46	6J5GT	.37	12A8GT	.46	42	.42
1U5	.39	6AT6	.37	6J6	.52	12AL5	.37	43	.55
1X2	.63	6AU6	.38	6J7G	.43	12AT6	.37	45	.35
2A5	.47	6AV6	.37	6K5GT	.48	12AT7	.56	50B5	.39
2X2	.39	6AX4	.53	6K6GT	.37	12AU6	.38	50C5	.39
3A4	.45	6B4G	.44	6K7G	.44	12AU7	.43	50C6	.59
3B5	.46	6B5	.44	6K7GT	.44	12AV6	.39	50L6GT	.41
3Q4	.48	6BA6	.39	6L6G	.64	12AV7	.59	50X6	.53
3Q5GT	.49	6BA7	.57	6L6GA	.64	12AX4	.48	50Y7	.50
				6Q7G	.43	12AX7	.48	50Y6GT	.48
				6Q7GT	.43	12BA6	.38	70L7GT	1.09
				6S4	.38	12BA7	.46	75	.41
				6S8	.53	12BH7	.52	76	.44
				6SA7GT	.43	12K7GT	.46	78	.47
				6SD7GT	.41	12Q7G	.39	80	.35
				6SH7GT	.73	12SA7GT	.44	117Z3	.37

Rad Tel TUBE CO.

"Integrity Is Our Chief Asset"

TERMS

A 25% deposit must accompany all orders—balance C.O.D. All shipments FOB Newark warehouse. Orders under $10—$1.00 Handling Charge. Subject to prior sale.

32 BEECHER STREET
NEWARK, NEW JERSEY

NEW! MOSLEY DUAL MATCH TV COUPLER...

... OPERATES 2 TV SETS FROM 1 ANTENNA!

IDEAL FOR:

- Two-Family Homes
- Apartments
- Other Multi-Set Installations



Here's a real convenience for folks who have an extra TV set in their play-room, den, or elsewhere. It's the new MOSLEY Dual-Match TV Coupler that permits two TV sets to operate from just one antenna—without one set interfering with the other. The Dual-Match is efficient, compact and low in price. It is easily installed without solder to standard 300 ohm transmission line.

The Dual-Match is available at most TV Dealers and Jobbers. Ask for Catalog Number 902—the New MOSLEY Dual-Match TV Coupler.
List Price, only..... **$3.95**

MOSLEY ELECTRONICS
2125 Lackland Road Overland, Missouri



Manufacturers' Literature

Readers are asked to write directly to the manufacturer for the literature. By mentioning RADIO & TELEVISION NEWS, the issue and page, and enclosing the proper amount, when indicated, delay will be prevented.

"Z-MATCHBOOKS"

Complete technical and sales details on the company's "Z-Match" yagi antennas are told in a unique promotion giveaway just released by *Channel Master Corp.* of Ellenville, New York.

The "Giant Z-Matchbook" measures 3⅜" x 4¼" closed and fully illustrates and describes how the "Z-Match" yagi eliminates mismatch and why it always matches 300-ohm transmission line, single or stacked. Diagrammatically, it shows how, in stacking, the impedance of the 300-ohm single "Z-Match" yagi is adjusted automatically so that a perfect 300-ohm match is provided for the entire stacked array.

Each individual match, 3" long, is imprinted with a specific sales message, including the fact that no stacking bars are required for these antennas.

"Z-Matchbooks," printed in 3 colors, are available to technicians, dealers, and installation men from the company's distributors.

RELAY CATALOGUE

Relay Sales, 833 W. Chicago Avenue, Chicago 22, Illinois has issued a handy catalogue which lists hundreds of relays which the company has in stock for immediate delivery.

Listed in this 1952 catalogue are standard telephone relays, short telephone types, midget units, dual-telephone relays, slow acting relays, aircraft contactors, rotary relays, *Western Electric* type "E" units, keying relays, sealed units, voltage regulators, differential relays, and special types of relays.

Copies of this catalogue, which lists these units by stock number, voltage, ohmage, contacts, manufacturer, and price, are available without charge upon request to the company.

TV SERVICE GUIDE

The second edition of *General Electric Company's* television receiver service guide is now available to distributors, dealers, and technicians.

New information has been added to the 80-page publication which is said to increase its usefulness to the industry. The original 17 x 11 inch size, the fingerprint and dirt-resistant paper, and the special binding have been retained in this second edition.

Like the first edition, the new service guide contains accurate information on 102 *General Electric* chassis, schematic diagrams with circuit symbol numbers, tube locations, top and bottom views, and cabling diagrams on each model. It also carries information on ten r.f. tuners used in these chassis. The picture section, identifying every postwar *G-E* television set, including the 24 inch; resistor, and ceramic and molded mica condensers color code charts have also been retained.

The new edition has been priced at $1.00 a copy and is currently available from the company's distributors.

ANTENNA TOWERS

Alprodco, Inc., Kempton, Indiana has issued a colorful new four-page catalogue which fully illustrates the company's antenna towers as well as all of the components used in erecting these towers.

Details are given on the economy "Tower-Pac" as well as on the various commercial accessories in the company's line.

NEEDLE CHART

Permo Inc., 6415 Ravenswood Avenue, Chicago 26, Illinois has recently published a needle correlation chart for use by dealers and distributors.

The new chart gives a cross reference of special type replacement needle stock numbers to "Fidelitone" stock numbers.

The needle chart is only one segment of the company's complete merchandising program which includes 110 different needles, special packaging for accurate replacement, installation tools and accessories, individually-colored identification labels on each package for different size needles, an automatic inventory and re-order system, etc.

Full details on the new merchandising program are available from "Fidelitone" distributors as are copies of the needle correlation chart.

"POWERSTAT" BULLETIN

The *Superior Electric Co.*, Bristol, Conn. has published a bulletin providing complete information on its new Type 10 "Powerstat" variable transformer.

Known as Bulletin P252, the new publication includes photographs, outline dimensions, ratings, and other descriptive material on the new Type 10 which provides a variable a.c. voltage control for low wattage applications.

Copies of Bulletin P252 are available without charge by writing to R. F. Grenne at the company.

RCA PARTS CATALOGUE

The Tube Department of *Radio Corporation of America* has issued a comprehensive parts catalogue designed to expedite the service dealer's parts-ordering activities.

The new catalogue lists more than 16,000 parts contained in *RCA Victor*

television receivers, radios, and phonographs, as well as a cross reference of replacement cabinets.

Parts are listed in numerical order by stock numbers and each listing includes a description, package quantity, and suggested list price. The catalogue will be revised and reissued periodically to keep it up-to-date.

Radio and television service dealers may secure copies of this publication by contacting their *RCA* parts distributors.

HI-FI REPRODUCTION

A 31-page technical treatise on the subject of high-fidelity reproduction has just been released by the *General Electric Company* and is currently available at the company's dealers.

Designed for audio fans, engineers, and service technicians, the booklet was written by three of the company's audio engineers, Mark Woodworth, Norm Cromwell, and Roy Dally. The booklet contains 19 illustrations and 18 charts or diagrams and covers a wide range of subjects within the field of high-fidelity reproduction.

Entitled "Why Variable Reluctance," the publication is divided into five sections containing information on the theory of operation of the variable reluctance cartridge, preamplifiers and equalization circuits, diamond and sapphire stylus comparison, converting to high fidelity, and a section devoted to data sheets, stylus and cartridge replacement charts, etc.

The booklet is available in limited quantities at 25 cents per copy.

BLILEY CATALOGUE

Of interest to hams, purchasing agents, and design engineers is the new Bulletin #43 recently released by *Bliley Electric Company*, Union Station Building, Erie, Pennsylvania.

The new 16-page catalogue, printed in two colors, contains much valuable data regarding performance, dimensions, frequency ranges, etc., of the complete *Bliley* line of crystals.

The bulletin also carries a two-page military section which gives a specification index for military crystal units in tabular form.

A special information section provides data on frequency temperature characteristics, drive levels, and processing procedures employed on special order crystals.

Copies of this new catalogue are available without charge by writing direct to the company.

SIMPSON CATALOGUE

The Simpson Electric Co., 5200 W. Kinzie Street, Chicago, Illinois has prepared a condensed four-page catalogue and price list especially for dealers.

The new publication contains illustrations of all the company's test instruments and panel meters including the new Model 276 oscilloscope calibrator which is currently being introduced to the trade.

All specifications, ranges, and other pertinent information such as weights

New WILLIAMSON TYPE AMPLIFIER Features

- First Williamson Type Amplifier supplied with matching preamplifier
- Uses Altec Lansing Peerless output transformer.
- Practically distortionless — Hardmond and intermodulation distortion both less than ¼ of 1% at 5 watts output.
- Frequency response ±1 db from 10 cycles to 100 kc.
- Output impedance 4, 8, or 16 ohms.

The new Heathkit Williamson Type Amplifier kit is the best obtainable in amplifiers today—the choice of the really discerning listener. You can hear the difference and measurements actually bear out the superb performance. Frequency response ± 1 db from 10 cycles to 100 kc allow you to hear the highs and lows with equal crispness and clarity. Harmonic and intermodulation distortion both less than ¼ of 1% at 5 watts output eliminate the harsh and unpleasant qualities which contribute to listening fatigue.

The circuit is similar to the one published in Audio Engineering Magazine for November, 1949, and is considered by engineers throughout the audio field as one of the best ever developed. The Main Amplifier (which may be purchased separately) consists of a voltage amplifier and phase splitter using a 6SN7, a driver stage using a 6SN7 and a push-pull output stage using a pair of 807 tubes. The output transformer is manufactured by the Peerless Division of Altec Lansing and is built to their highest standards. Output impedances of 4, 8, and 16 ohms are available. The power supply uses a separate chassis with husky Chicago Transformer power transformer and choke, and 700V Mallory filters for long hum-free operation. A 5V4G rectifier is used.

The main amplifier and power supply are each on a chassis measuring 7" high by 8½" wide by 11" long.

PREAMPLIFIER AND TONE CONTROL UNIT KIT

The preamplifier kit consists of a 12AX7 (or 12AY7) dual triode first amplifier stage with a turn-over control for LP or 78 record types, and a 12AU7 amplifier stage with individual bass and treble tone controls which each provide up to 15db of boost or attenuation. A switch on panel selects either magnetic, crystal, or tuner inputs. Preamplifier also is well suited to custom installations—it will operate in either vertical or horizontal position, and special notched shafts of the controls and switches allow a variety of shaft lengths to be selected. Dimensions: 2¼" high by 10¼" wide by 7¼" deep.

Heathkit AMPLIFIER KIT



WA-A1 Amplifier kit—Combination 1—(Main Amplifier and Power Supply) complete with WA-P1 Preamplifier kit. Total Ship. Wgt., 34 lbs. (Shipped Express only) $69.50

WA-A1 Amplifier kit only—Combination 4—(Main Amplifier and Power Supply). Less WA-P1 Preamplifier. Total ship. Wgt., 20 lbs. (Shipped Express only) $49.75

WA-P1 Preamplifier Kit only. (less power supply) (Tubes included). Total Ship. Wgt., 7 lbs. (Shipped Express or Parcel Post) $19.75

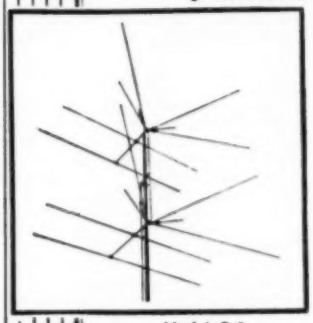
WRITE FOR Free CATALOG

The HEATH COMPANY
BENTON HARBOR 15, MICHIGAN

You SAVE BY ORDERING DIRECT

NEW-DIFFERENT-POWERFUL

A completely new large type conical antenna designed for highest maximum gain on all channels — 2 to 13



- RUGGED CONSTRUCTION
- DOUBLE PLATE DIPOLE HOLDERS
- 7/16" ALUMINUM TUBING
- OAK DOWEL PINS
- CRIMPED ENDS
- MICARTA INSULATORS
- CAST ALUMINUM MAST CLAMPS
- Mast clamp assembly will take 1" to 1¾" O.D. mast or pipe.

Model C-2

Radiation Lobe:
High Band: 6° left to right
Low Band: 10° left to right

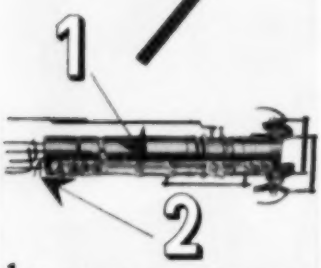
Signal strength in comparison to dipoles cut to station.

High band:	Low band:
7 times dipole	4 times dipole

Contact your distributor for prices.

Manufactured by:
KAY-TOWNES ANTENNA CO.
P.O. BOX 586 ROME, GA. 1511 DEAN AVE.

Six quality features of all Tung-Sol Picture Tubes mean better TV receiver operation



1. Glass bead type assembly is stronger, both mechanically and electrically—gives greater protection against leakages and arcing.

2. Double cathode tab provides double protection against failure in the cathode circuit.



3. Low resistance of outside conductive coating minimizes radiation of horizontal oscillator sweep frequency.

4. Fortified screen composition resists burning (X pattern).

5. Rigid control of internal conductive coating materially improves service reliability.

6 Tung-Sol Picture Tubes can be used with single or double field ion trap designs.



TUNG-SOL

RADIO, TV TUBES, DIAL LAMPS

TUNG-SOL ELECTRIC INC., Newark 4, N. J.

Sales Offices: Atlanta • Chicago • Culver City (Calif.) Dallas • Denver • Detroit • Newark

Tung-Sol makes All-Glass Sealed Beam Lamps, Miniature Lamps, Signal Flashers, Picture Tubes, Radio, TV and Special Purpose Electron Tubes.

and dealer's net prices are arranged so that they can be seen at a glance.

Copies of Form 2052 can be obtained from Mel Buehring at the company address or from the company's representatives.

"PRODUCT INDEX"

P. R. Mallory & Co., Inc., 3029 E. Washington St., Indianapolis 6, Ind. is now distributing copies of its "Product Index" which provides specific information, in condensed form, on its electrochemical, electromechanical, electronic, and metallurgical products.

The catalogue includes a brief description of the specifications, features and applications of the complete line of *Mallory* batteries, condensers, contacts, rectifiers, resistors, switches, vibrators, metals and ceramics, tuners, and resistance welding supplies.

TEST EQUIPMENT

Precise Development Corporation, Oceanside, New York has released the first in its new series of catalogue sheets covering its line of test equipment.

Among the units illustrated and described in this two-color publication are the Model 630 r.f.-a.f.-TV marker generator; the Model 909 v.t.v.m.; the Model 907 deluxe v.t.v.m.; the Model 635 universal a.f. sine, square, and pulse generator; the Model 912 r.f. probe; and the Model 999 high voltage probe.

Requests for copies of this catalogue sheet should be addressed to the company.

SOLA CATALOGUE

Sola Electric Co., 4633 West 16th Street, Chicago 50, Illinois has issued a new constant voltage transformer catalogue, the "Number CV-142."

This 22-page booklet is an up-to-date cross reference covering the company's line of constant voltage transformers. It covers both standard regulators and four new types which have been added to the line since the publication of the previous catalogue.

The new publication includes photographs, schematic diagrams, and dimensional drawings of every unit offered. It also includes performance charts, harmonic analysis, electrical and mechanical specifications.

Copies are available on letterhead request. Please specify Bulletin P-100-CV 142.

MOBILE ANTENNAS

Ward Products Corp., 1523 East 45th street, Cleveland 3, Ohio has released two new mobile communications bulletins covering its Models SPP-143 and SPPB-71.

The first bulletin describes the Model

Through an inadvertent transposition of type, copies of Tru-Ohm Products' new resistor catalogue were listed at 15 cents each in the item appearing on page 98 of the May issue. These catalogues are available without charge from the company. Address your requests to the firm at 2800 N. Milwaukee Ave., Chicago 18, Illinois.

"WE'RE TEARING OUR HAIR OUT . . ."



TO BUY THIS EQUIPMENT!

WE NEED	WE'LL PAY	WE NEED	WE'LL PAY
ATC or T-47 type		BC ARN-7	up to $ 45.00
ART-13	up to $250.00	TS-251	up to 175.00
BC-348	up to 70.00	FL-10 or F-21	
BC-312	up to 70.00	ARA-8 Adapter	
BC-221	up to 45.00	Filters	up to 6.00 ea.

WANTED ALSO: TS-147, TS-148, WTA-1B, MG-149, plus parts or components. In fact, we'll buy practically anything in this field. Phone, wire or write.

V & H RADIO & ELECTRONICS SUPPLY CO.
2033 W. Venice Blvd., Los Angeles 6, Calif.
Telephone: REpublic 3-1127

EASY TO LEARN CODE

It is easy to learn or increase speed with an Instructograph Code Teacher. Affords the quickest and most practical method yet developed. For beginners or advanced students. Available tapes from beginner's alphabet to typical messages on all subjects. Speed range 5 to 40 WPM. Always ready—no QRM.



ENDORSED BY THOUSANDS!

The Instructograph Code Teacher literally takes the place of an operator-instructor and enables anyone to learn and master code without further assistance. Thousands of successful operators have "acquired the code" with the Instructograph System. Write today for convenient rental and purchase plans.

INSTRUCTOGRAPH COMPANY
4711 SHERIDAN ROAD, CHICAGO 40, ILLINOIS

WE'LL PAY SWEET PRICES for Your RADIO & AIRCRAFT EQUIPMENT

We want to buy your parts of equipment—and we'll pay top dollar to get it! Just send us the do-jee on your equipment, its type and condition—and your asking price. You'll get fast, profitable action. It's just like taking "Candee" from a baby! Write today.

CANDEE-AIRCO, Dept. T-2
3306 Burbank Blvd. Burbank, California

TWO DOTS MAKE THE LETTER i

GET in on the fun of operating your own licensed transmitter. I guarantee you will memorize the International Morse Code alphabet within two hours by my simple picture method, or return method within five days and I will refund your money.

COMPLETE COURSE ONLY $1
NOTHING ELSE TO BUY!
OTTO LUTHER, NEW PRESTON, CONN.

SELL Jensen PHONO NEEDLES For Any Type Record Player

Please send me **FREE** Jenselector. Picks the proper replacement needle.

Name_____

Address_____

City_____ State_____

Jensen Industries, Inc., 336 S. Wood St., Chicago 12

SPP-143, an antenna with a single hole mounting that can be installed in the same place as a standard auto aerial. The Model SPPB-71, described in the second bulletin, is designed to have the same outward appearance as a standard auto aerial, while operating on regular mobile frequencies.

Free copies of these two sheets may be obtained from *Ward* distributors or from the company direct.

FUSE PRICE LIST

Littelfuse, Inc., 1865 Miner Street, Des Plaines, Illinois has issued a completely illustrated list price sheet covering its line of fuses.

The new four-page sheet contains actual-size drawings of 25 fuse types and lists blowing characteristics. By matching the blown fuse to the illustration, the jobber counterman or service technician can determine, quickly and accurately, the replacement fuse needed. –30–

V.H.F. FIELD DAY

THE Purple Glow V. H. F. Club of Albuquerque has announced that it will man six- and two-meter stations on Sandia Crest, 10,600 feet up, overlooking the New Mexican desert during the V. H. F. Field Day, June 7th and 8th.

A 40-meter rig, operating on 7155, will be used for local schedules and liaison work. All activity will be under the call W5RFF/5.

Address all communications regarding schedules or other details to A. David Middelton, W5CA, at Tijeras, New Mexico. –30–

OPPOSES 29,640 KC. OPERATION

EGYPTIAN Radio Club, Inc. of Granite City, Illinois has voiced its opposition to use of 29,640 kc. as a "calling" frequency only and urges all emergency corps in various cities in the U. S. to continue present use of this frequency as a local net operating frequency and to contact their directors and insist that ARRL discontinue its proposal of a national calling frequency only on 29,640 kc.

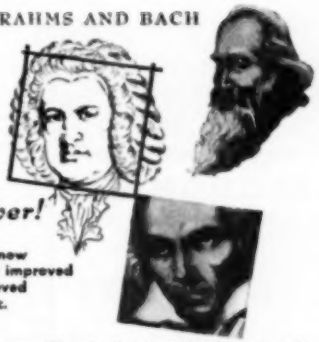
The Club points out 29,640 kc. was chosen by the group as an operating net frequency. The net includes mobiles in the entire St. Louis area. Actual drills are held regularly on this frequency or monitored for contacts with other mobiles in the area in case the band is not open.

The members contend that by building up interest in this frequency operation they found that when disaster struck they were able to be on the scene in a matter of minutes. So far they have encountered little interference from other stations. In cases where a distant station came in on the frequency, a call to them would clear them and, in most cases, they would stand by on the frequency to help keep it clear of interference.

The Club believes that 29,640 kc. is not intended to be used for long haul traffic and should be used as a local ground wave frequency.

The Club is asking other emergency nets operating on this frequency to join them in protesting its use as a calling frequency. –30–

THE 3 Bs... BEETHOVEN, BRAHMS AND BACH



they're different

they're improved

they're better than ever!

Yes, Bach, Beethoven and Brahms are now better than ever—we don't mean we've improved their music, but we do mean we've improved the reproduction of their *recorded* music.



It's the new, improved Pickering Cartridges that give credence to this claim. Yes, Pickering Cartridges are different. They're improved. They're better than ever. Pickering patented Cartridges with Dynamic Coupling* are superior in every way, by providing: **HIGHER FREQUENCY RESPONSE • NEGLIGIBLE INTERMODULATION DISTORTION • BETTER TRACKING CHARACTERISTICS**

***DYNAMIC COUPLING ASSURES** constant stylus contact with the record grooves over the entire audio spectrum (20-20,000 cps) • full frequency response • full transient response • no resonances • no mistracking • no grinding of groove walls

PICKERING *and company, incorporated*

Pickering High Fidelity Components are available through leading Radio Parts distributors everywhere; detailed literature sent upon request. Address Department C

Oceanside, L. I., New York

RIGHT! --- from any angle



A challenging answer to low cost, wide-angle high fidelity reproduction. Diffusicone-12 is a newly engineered speaker with exclusive dual concentric cone design, which diffuses the normally beam-like high frequencies. Results in exceptionally uniform response . . . assures full range reception over the entire listening area.

Write today for Bulletin 62N73 — address inquiries to Desk 62.

THE NEW University DIFFUSICONE-12

An Engineering Achievement of UNIVERSITY LOUDSPEAKERS, INC.
80 So. Kensico Ave., White Plains, New York

For sound trucks • parades
carnivals • resorts • busses
outdoor meetings

ECONOMICAL MOBILE AMPLIFIERS *by* **Newcomb**



MODEL E-25MP

Newcomb mobile amplifiers are carefully built for the rugged conditions of mobile use and to deliver consistently the top quality performance you expect from any Newcomb amplifier. Dollar for dollar they give you more good service, more convenient operational features and more all around, long time satisfaction.

MODEL E-25MP delivers 25 watts from either 6 volt battery or 117 A.C. It has a standby switch, separate power and phono switches and inputs for 2 mikes and 1 phono. Heavy duty plugs. 2000 volt hermetically sealed buffer condenser. Phase correction capacitator for phono motor.

MODEL E-25M is the same amplifier without phono top.

MODEL E-10M is a rugged, low cost, 10 watt unit also for either battery or A.C. power. Has standby switch, inputs for 1 mike, 1 phono. Special mounting simplifies installation and removal.



E-10M

Send for full information today!



NEWCOMB AUDIO PRODUCTS CO.

Dept. F, 6824 Lexington Ave., Hollywood 38, Calif.

Factors Influencing Hi-Fi

(*Continued from page 66*)

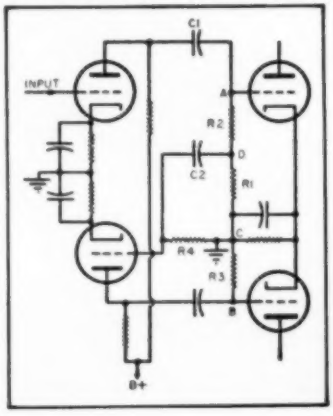
poorly regulated supply source for the screen. Where the voltage must be dropped for the screen, it is advisable to use a heavy voltage divider with a large amount of bypass capacity. At least 10 μfd. should be used, with 20 μfd. or 30 μfd. to be much preferred. Voltage regulating tubes connected across the screen supply next to the screen take-off are quite effective.

5. *Power Supply Regulation*—The regulation of the power supply is directly related to low distortion. A good amplifier operated off a poorly regulated power supply will have excessive distortion. This is especially true of the low audio frequencies where the power supply becomes a source of degeneration even though the amplifier is operating strictly class "A" throughout. This means low series resistance in the power supply, *i.e.*, low resistance chokes and good size rectifier tubes.

The output section of the filter condenser should be large; not merely for its filtering qualities but to furnish a low impedance path to ground for audio frequencies.

6. *Balancing of Phase Inverter*—Experience indicates that all too often too little attention is given to balancing of the phase inverter where this type circuit is used to replace a push-pull transformer. Fig. 7 illustrates probably the most widely used phase inverter circuit. With the amplifier running at near its maximum output with a sine wave input, the audio voltage from points *A* to *C* and *B* to *C* should be compared. This may be measured with an oscilloscope or high impedance a.c. v.t.v.m. The two voltages should be within 5%, preferably closer. If they are not, *R*, should be either increased or decreased, as the case may be, until the two voltages are equal. It should be noted that defective tubes may result in the same unbalance and

Fig. 7. Balance check points on phase inverter. Audio voltages from points A to C and B to C should be approximately equal.



Finest **FRINGE AREA** *Antenna*



VELA

CORNER REFLECTOR
- HIGH GAIN 12 db
- BROAD BAND CHANNELS 2 to 6
- HIGH FRONT TO BACK RATIO
- RUGGED CONSTRUCTION

ORDER NOW!
Immediate delivery
LIST **$54.50**

Dealer inquiries invited

VIDEO ELECTRONICS
1220½ Grand Ave. Des Moines, Ia.

OLSON HAS BIG, BIG BARGAINS



G E Variable Reluctance Phono Cartridge RPX-010

Stock No. XC-49
Single, ea., $1.99



$1.75 Lots of 10, ea.

Get the entire General Electric Variable Reluctance Phono Cartridge with needle for less than the cost of the needle alone. Thousands sold at $4.66. Now while supply lasts you can get this cartridge with built-in genuine 3 mil sapphire needle. Plays 78 RPM records.

SEE OLSON'S BIG ADS ON PAGES 86 & 87

OLSON RADIO WAREHOUSE
277 E. Market St. Akron 8, Ohio

TRAIN FOR A SUPERVISORY POSITION IN
ELECTRONICS

Thorough 2-year course covers electrical circuits and machinery, basic electronics and industrial electronics. Franklin Technical Institute graduates are in demand as junior engineers for research and test work, sales engineering, supervisory work on production lines and drafting room design work. Other engineering and technical courses. Coed. Day, evening. 44th year. Write for catalog.

FRANKLIN TECHNICAL INSTITUTE
46 Berkeley Street Boston 16, Mass.

$ RESISTOR KITS $
100 ASSORTED POPULAR SIZES
½ Watt, 10% All Late Type Insulated IRC—Stackpole—Speer—Ohmite. Cash with Order. **2.00** Shipped Pre-Paid

DRILLICK ELECTRONIC SALES CO.
$ 5281 W. Pico Blvd. Los Angeles 19, Calif. $

WALKIE TALKIES $4.99 Complete Set of 2

POCKET SIZE



—ELECTRONIC VOICE POWERED
No tubes, batteries, adjustments, license or permit needed! Guaranteed to work anywhere up to ½ mile with extra wire. Swell for garage to house, etc.! Your own private, talk-listen phone. Not war surplus. Brand new. Solid Alloy Metal Case. Two complete units with wire—READY TO USE. SEND ONLY $1.00 deposit and pay postman $4.99 C.O.D. or send $6.99 for PP delivery. Build units by real finish. MIDWAY CO., Dept. WRT-6, KEARNEY, NEBRASKA

KITS
RADIOS
TELEVISION
A.C./D.C. Operated
TEST INSTRUMENTS
Write for FREE Catalog
ARKAY—Radio Kits, Inc.
120 Cedar St. New York 6, N. Y.
KITS

this possibility should be eliminated before changing the value of R_k.

A balance may be obtained at 400 or 1000 cycles, but due to phase shift caused by R_c and C_b, be unbalanced at low frequencies. To avoid this, C_b and R_c should be as large in value as possible.

7. *Coupling Condensers*—In order to extend the low frequency response, the coupling condensers should be quite large. Large values, however, are disadvantageous for two reasons. The likelihood of leakage increases with the large values of coupling condensers. Leakage tends to put "B+" on the negative grid of the following stage. Secondly, large coupling capacity may cause blocking of the next stage grid, especially if its grid return resistor is of a large value.

A rough guide to follow here is to select condensers by means of a sensitive ohmmeter for extremely low leakage and to use as low a value of grid resistor in the next stage as possible when the coupling capacity is large.

Frequency Response

With present day components, frequency response from 30 cycles to 15,000 cycles ±1 db is relatively easy to obtain. Practically all the audio equipment of broadcast stations and the better recording studios, as well as a good many sound systems, meet or approach this response.

1. *Transformers*—Perhaps the most important components in wide range amplifier design are the transformers. Regardless of the quality of the other components, the input and output transformers become the limiting factors in the response curve. These must be selected for the highest and lowest responses desired and must be capable of this response at the desired input and output levels.

The manufacturer's literature must serve as the guide here. Even here a bit of conservatism on the buyer's part may pay dividends as many commercial units are a bit on the shy side in actual usage. The actual response as taken in the supplier's laboratory may easily meet the response specifications when measured with pure resistive loads; yet under actual loads encountered, they may fall off sharply in response. This is particularly true of input transformers.

2. *Low Value Plate Load Resistors*—Low values of plate load resistors are necessary to prevent drop-off of the high frequencies. Values above 100,000 ohms are seldom encountered in the higest quality audio equipment. In fact, an inspection of broadcast equipment of modern vintage will disclose plate load resistor values of 82,000, 56,000 and even as low as 24,000 ohms.

The lower the value, the less shunt effect the tube interelectrode capacities and wiring capacities have on the high frequencies.

3. *Large Value Coupling Condensers*—The low frequency response is dependent on the value of coupling



Before you spend money for RECORDS, consult

High-Fidelity

the Big Magazine of Information about Records and Hi-Fi Equipment for Your Home

BEFORE YOU BUY NEW RECORDS: Make it a habit to check the reviews in HIGH-FIDELITY by such outstanding critics as John Conly, Alfred Frankenstein, C. G. Burke, and John Indcox. If a new release is worth buying, you'll find it listed. Also, you'll find it compared with other recordings of the same composition. Thus HIGH-FIDELITY can help you to avoid mistakes, and to choose the best recording of any composition you want. Playing time and price of each record is shown.

SPECIAL FEATURE: The Spring Issue contains C. G. Burke's monumental research work which reviews every LP ever made of Beethoven's music. In book form, it would occupy 120 pages.

BEFORE YOU BUY HI-FI EQUIPMENT: Make it a habit to consult the elaborately-illustrated articles in HIGH-FIDELITY on record-players, styli, tape recorders, FM and TV tuners, amplifiers, speakers, and modern decorative ideas for home installations, all described in non-technical language.

Mail Coupon Today! Big Spring issue now ready for mailing.

HIGH-FIDELITY is a quarterly magazine, devoted to the interests of people who enjoy the best in home musical entertainment. It is a large-size magazine, beautifully illustrated, and handsomely printed on fine paper.

Published by
MILTON B. SLEEPER



Mr. Charles Fowler, Editor, High Fidelity Magazine
15 Audio Building, Great Barrington, Mass.

Please enter my subscription to High Fidelity Magazine:
☐$6.00 for three years (SAVE $6) ☐$3.00 for one year (SAVE $1)

Name_____

Address_____

Add 50¢ per year for Canada, $1.00 foreign countries

Announcing
NEW ELECTRONIC FILTERS*
and
TUNED AUDIO AMPLIFIERS*



Here's great news for engineers in all audio and specialized electronic fields where precise measurements and sensitive controls are of paramount importance—

→ Our newly developed Type EF Electronic Filter when added to any commercial oscillator (with 3% distortion) will result in a reduction of distortion to less than 0.03%, about 30 times less than expensive laboratory units!

→ When added to a laboratory oscillator, the new Type EF Electronic Filter will reduce distortion to less than 0.01%, which makes it suitable for significant intermodulation or frequency distortion measurements.

→ The new Type "A" Tuned Amplifier, when inserted between a bridge balancing network and its indicator or control, will increase sensitivity of measurement or control by a factor of 1000 to 1!

These units are also suitable for a wide variety of super-sensitive phase discriminatory control circuits and have many other valuable applications.

Write for Complete Description and Prices on 12 Different Models

*Patent pending

AMPLIFIER CORP. OF AMERICA
398-2 Broadway, New York 13, N. Y.

MARINE RADIO DEALERS

THE NEW G.L. MARINER—Model 100A

Here is the 1952 version of the famous G.L. MARINER 100 watt transmitter. Designed to conform with all new F.C.C. regulations. New features include built-in harmonic suppressor, front mounted R.F. meter, 150 watt input, 100 watts to antenna. Four-channel, crystal controlled. Contains break-in relay for receiver in addition to antenna switching relay. Dimensions: 81¼ deep, 18¼ wide, 19½ high. Comes with dynamotor, mounting cords, mike, crystals, installation and operating instructions, including plans for an easily constructed top loaded marine antenna. 12 or 24 volts (please specify).
Your Selling Price, $382.50. DEALER'S COST **$349.50**

G.L. MARINER—Model 50B

Perfect for small boat installations where inches count. 50 watts, four-channel crystal controlled. This popular conversion of the Navy ATA 21-3 mc transmitter includes a startlingly effective push to talk modulation system. Minimum 50 watts into antenna, 95% modulated. Contains break-in relay. Only 12" long, 5¼ wide, 7¼ high. With dynamotor, R.F. meter, modulator, microphone, connecting cords. 12 or 24 volts. Your Selling Price, $319.00. DEALER'S COST **$189.50**
Add $20.00 for 32 volt system.

G.L. MARINER REMOTE CONTROL RECEIVER

All that's needed in cabin is a small control box and a speaker! Tunes 200-1100 kc and 2-10 mc. Completely sensitive, accurate, better than 1% Remote choice of AVC, MVC or CW. Remote control box is only 5¼" wide, 6" high, and 2" deep. Receiver itself is 11" wide, 8 3/16" high, 18½" long, with built-in dynamotor. Includes speaker, mike, plugs, flexible shaft and control cable. 24 or 32 volts. Your Selling Price, $265.00. DEALER'S COST **$159.50**
Add $10.00 for 32 volt system.

G.L. MARINER RECEIVER, MARINE ONLY

This is famous Navy model ARC command receiver, 1.5 to 3 mc, giving lots of spread in Marine band. Is companion set to our Model 50B transmitter, but may be used with any transmitter. Wide ratio tuning dial for instant setting to frequencies you specify. Furnished to mount in cabin with breadth leads and leads to power the DU-1 loop if desired. Requires external speaker. With tubes and crystal for Marine Band: 24 or 32 volts Dealer's Cost, $49.50. 12 volts Your Selling Price, $90.00. **$59.50**
DEALER'S COST
Low Wave Band: 24 or 32 volts. Dealer's Cost, $59.50; 12 volts Dealer's Cost, $69.50.

DU-1 MANUAL DIRECTION FINDER

Goes ahead of any receiver. We convert it to marine band. Still retains broadcast band. Broadcast band and all the lighthouse and beacon band. 2 tube phasing circuit, no 180° ambiguity. Gives true bearing in 5 seconds! We furnish schematics and complete instructions. 12, 24 or 32 volts. BRAND NEW
Your Selling Price, $79.50. DEALER'S COST **$47.50**

G.L. MARINER SPEAKER

In neat bulkhead mounting baffle, wired with transformer, cord, and plugs. To match 4000 ohms output of G.L. MARINER receivers. Your Selling Price, $9.95. DEALER'S COST **$5.95**

BE SURE TO SPECIFY WHETHER POS. OR NEG. GROUNDED SYSTEM

For complete listing, including Model 1000A, G.L. Mariner Model 2000A Automatic Direction Finder, etc., send for our catalogue.

G.L. ELECTRONICS 908 S. Vermont Ave. Los Angeles 6, Cal.
25% required on C.O.D. orders.
DEALERS: WE DO NOT ADVERTISE TO CONSUMERS.

For sound trucks • parades
carnivals • resorts • busses
outdoor meetings

ECONOMICAL
MOBILE
AMPLIFIERS
by
Newcomb



MODEL E-25MP

Newcomb mobile amplifiers are carefully built for the rugged conditions of mobile use and to deliver consistently the top quality performance you expect from any Newcomb amplifier. Dollar for dollar they give you more good service, more convenient operational features and more all around, long time satisfaction.

MODEL E-25MP delivers 25 watts from either 6 volt battery or 117 A.C. It has a standby switch, separate power and phono switches and inputs for 2 mikes and 1 phono. Heavy duty plugs. 2000 volt hermetically sealed buffer condenser. Phase correction capacitator for phono motor.

MODEL E-25M is the same amplifier without phono top.

MODEL E-10M is a rugged, low cost, 10 watt unit also for either battery or A.C. power. Has standby switch, inputs for 1 mike, 1 phono. Special mounting simplifies installation and removal.



E-10M

Send for full information today!



NEWCOMB
AUDIO PRODUCTS CO.

Dept. F, 6824 Lexington Ave., Hollywood 38, Calif.

Factors Influencing Hi-Fi

(*Continued from page 66*)

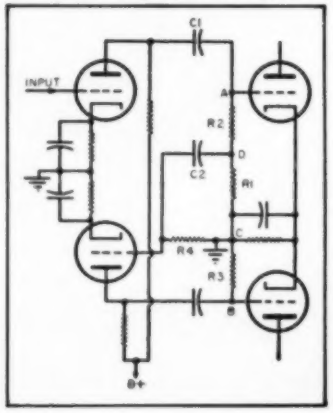
poorly regulated supply source for the screen. Where the voltage must be dropped for the screen, it is advisable to use a heavy voltage divider with a large amount of bypass capacity. At least 10 μfd. should be used, with 20 μfd. or 30 μfd. to be much preferred. Voltage regulating tubes connected across the screen supply next to the screen take-off are quite effective.

5. *Power Supply Regulation*—The regulation of the power supply is directly related to low distortion. A good amplifier operated off a poorly regulated power supply will have excessive distortion. This is especially true of the low audio frequencies where the power supply becomes a source of degeneration even though the amplifier is operating strictly class "A" throughout. This means low series resistance in the power supply, i.e., low resistance chokes and good size rectifier tubes.

The output section of the filter condenser should be large; not merely for its filtering qualities but to furnish a low impedance path to ground for audio frequencies.

6. *Balancing of Phase Inverter*—Experience indicates that all too often too little attention is given to balancing of the phase inverter where this type circuit is used to replace a push-pull transformer. Fig. 7 illustrates probably the most widely used phase inverter circuit. With the amplifier running at near its maximum output with a sine wave input, the audio voltage from points *A* to *C* and *B* to *C* should be compared. This may be measured with an oscilloscope or high impedance a.c. v.t.v.m. The two voltages should be within 5%, preferably closer. If they are not, R_1 should be either increased or decreased, as the case may be, until the two voltages are equal. It should be noted that defective tubes may result in the same unbalance and

Fig. 7. Balance check points on phase inverter. Audio voltages from points A to C and B to C should be approximately equal.



Finest
FRINGE AREA
Antenna



VELA
CORNER REFLECTOR
• HIGH GAIN 12 db
• BROAD BAND CHANNELS 2 to 6
• HIGH FRONT TO BACK RATIO
• RUGGED CONSTRUCTION

ORDER NOW!
Immediate delivery
LIST
$54.50

Dealer Inquiries Invited

VIDEO ELECTRONICS
1220½ Grand Ave. Des Moines, Ia.

OLSON HAS BIG, BIG BARGAINS



G E Variable Reluctance
Phono Cartridge RPX-010
Stock No. XC-49
Single, ea., $1.99
$1.75 Lots of 10, ea.

Get the entire General Electric Variable Reluctance Phono Cartridge with needle for less than the cost of the needle alone. Thousands sold at $4.95. Now while supply lasts you can get this cartridge with built-in genuine 3 mil sapphire needle. Plays 78 R.P.M. records.
SEE OLSON'S BIG ADS ON PAGES 86 & 87

OLSON RADIO WAREHOUSE
277 E. Market St. Akron 8, Ohio

TRAIN FOR A SUPERVISORY POSITION IN
ELECTRONICS
Thorough 2-year course covers electrical circuits and machinery, basic electronics and industrial electronics. Frank-lin Technical Institute graduates are in demand as junior engineers for research and test work, sales engineering, supervisory work on production lines and drafting room design work. Other engineering and technical courses. Cond. Day, evening. 46th year. Write for catalog.
FRANKLIN TECHNICAL INSTITUTE
46 Berkeley Street Boston 16, Mass.

$ RESISTOR KITS $
100 ASSORTED POPULAR SIZES
½ Watt, 10%, All Late Type Insulated IRC—Stackpole—Speer—Ohmite. Cash with Order. $2.00 Shipped Pre-Paid
DRILLICK ELECTRONIC SALES CO.
$ 5281 W. Pico Blvd. Los Angeles 19, Calif. $

WALKIE TALKIES $4.99 Complete Set of 2
—ELECTRONIC VOICE POWERED—
POCKET SIZE



No tubes, batteries, adjustments, license or permit needed! Guaranteed to work anywhere up to ½ mile with extra wire. Swell for garage to house, etc.! Your own private, talk-listen phone. Not war surplus. Brand new. Solid Aluminum Case. Two complete units with wire—READY TO USE! SEND ONLY $4.00 deposit and pay postman $1.99 C.O.D. or send $4.99 for the pair delivered postpaid. Limit 2 sets to a customer.
MIDWAY CO., Dept. WRT-6, KEARNEY, NEBRASKA

KITS
RADIOS
2 & 3 band Battery and/or battery
TELEVISION
TEST INSTRUMENTS
Write for FREE Catalog
ARKAY—Radio Kits, Inc.
120 Cedar St. New York 6, N. Y.
KITS

this possibility should be eliminated before changing the value of R_1.

A balance may be obtained at 400 or 1000 cycles, but due to phase shift caused by R_1 and C_2, be unbalanced at low frequencies. To avoid this, C_2 and R_1 should be as large in value as possible.

7. *Coupling Condensers*—In order to extend the low frequency response, the coupling condensers should be quite large. Large values, however, are disadvantageous for two reasons. The likelihood of leakage increases with the large values of coupling condensers. Leakage tends to put "B+" on the negative grid of the following stage. Secondly, large coupling capacity may cause blocking of the next stage grid, especially if its grid return resistor is of a large value.

A rough guide to follow here is to select condensers by means of a sensitive ohmmeter for extremely low leakage and to use as low a value of grid resistor in the next stage as possible when the coupling capacity is large.

Frequency Response

With present day components, frequency response from 30 cycles to 15,000 cycles ±1 db is relatively easy to obtain. Practically all the audio equipment of broadcast stations and the better recording studios, as well as a good many sound systems, meet or approach this response.

1. *Transformers*—Perhaps the most important components in wide range amplifier design are the transformers. Regardless of the quality of the other components, the input and output transformers become the limiting factors in the response curve. These must be selected for the highest and lowest responses desired and must be capable of this response at the desired input and output levels.

The manufacturer's literature must serve as the guide here. Even here a bit of conservatism on the buyer's part may pay dividends as many commercial units are a bit on the shy side in actual usage. The actual response as taken in the supplier's laboratory may easily meet the response specifications when measured with pure resistive loads; yet under actual loads encountered, they may fall off sharply in response. This is particularly true of input transformers.

2. *Low Value Plate Load Resistors*—Low values of plate load resistors are necessary to prevent drop-off of the high frequencies. Values above 100,000 ohms are seldom encountered in the higest quality audio equipment. In fact, an inspection of broadcast equipment of modern vintage will disclose plate load resistor values of 82,000, 56,000 and even as low as 24,000 ohms.

The lower the value, the less shunt effect the tube interelectrode capacities and wiring capacities have on the high frequencies.

3. *Large Value Coupling Condensers*—The low frequency response is dependent on the value of coupling



Before you spend money for RECORDS, consult

High-Fidelity

the Big Magazine of Information about Records and Hi-Fi Equipment for Your Home

BEFORE YOU BUY NEW RECORDS: Make it a habit to check the reviews in HIGH-FIDELITY by such outstanding critics as John Conly, Alfred Frankenstein, C. G. Burke, and John Indcox. If a new release is worth buying, you'll find it listed. Also, you'll find it compared with other recordings of the same composition. Thus HIGH-FIDELITY can help you to avoid mistakes, and to choose the best recording of any composition you want. Playing time and price of each record is shown.

SPECIAL FEATURE: The Spring Issue contains C. G. Burke's monumental research work which reviews every LP ever made of Beethoven's music. In book form, it would occupy 120 pages.

BEFORE YOU BUY HI-FI EQUIPMENT: Make it a habit to consult the elaborately-illustrated articles in HIGH-FIDELITY on record-players, styli, tape recorders, FM and TV tuners, amplifiers, speakers, and modern decorative ideas for home installations, all described in non-technical language.

Mail Coupon Today! Big Spring issue now ready for mailing.

HIGH-FIDELITY is a quarterly magazine, devoted to the interests of people who enjoy the best in home musical entertainment. It is a large-size magazine, beautifully illustrated, and handsomely printed on fine paper.

Published by
MILTON B. SLEEPER

Mr. Charles Fowler, Editor, High Fidelity Magazine
15 Audio Building, Great Barrington, Mass.

Please enter my subscription to High Fidelity Magazine:
☐$6.00 for three years (SAVE $4) ☐$3.00 for one year (SAVE $1)

Name_____

Address_____

Add 50¢ per year for Canada, $1.00 foreign countries

Announcing
NEW ELECTRONIC FILTERS*
and
TUNED AUDIO AMPLIFIERS*

Here's great news for engineers in all audio and specialized electronic fields where precise measurements and sensitive controls are of paramount importance—

- Our newly developed Type EF Electronic Filter when added to any commercial oscillator (with 3% distortion) will result in a reduction of distortion to less than 0.01%, about 30 times less than expensive laboratory units!
- When added to a laboratory oscillator, the new Type EF Electronic Filter will reduce distortion to less than 0.01%, which makes it suitable for significant intermodulation or frequency distortion measurements.
- The new Type "A" Tuned Amplifier, when inserted between a bridge balancing network and its indicator or control, will increase sensitivity of measurement or control by a factor of 1000 to 1!

These units are also suitable for a wide variety of super-sensitive phase discriminatory control circuits and have many other valuable applications.

Write for Complete Description and Prices on 12 Different Models

*Patent pending

AMPLIFIER CORP. OF AMERICA
398-2 Broadway, New York 13, N. Y.

MARINE RADIO DEALERS

THE NEW G.L. MARINER—Model 100A

Here is the 1952 version of the famous G.L. MARINER 100 watt transmitter. Designed to conform with all new F.C.C. regulations. New features include built-in harmonic suppressor, panel mounted R.F. meter. 150 watt input, 100 watts to antenna. Four-channel, crystal controlled. Contains break-in relay for receiver. In addition to operating relay, antenna switching relay. Dimensions: 8½" deep, 18¼" wide, 19½" high. Complete with dynamotor, mounting rack, mike, crystals. Installation and operating instructions, including plans for an easily constructed top loaded mobile antenna. 12 or 24 volts (please specify). Your Selling Price, $982.50. DEALER'S COST **$349.50**

G.L. MARINER—Model 50S

Perfect for small boat installations where inches count. 50 watts, four-channel crystal controlled. This popular conversion of the Navy ATA 2.1-3 mc transmitter includes a startlingly effective post war modulation system. Minimum 50 watts into antenna, 95% modulated. Contains break-in relay. Only 12" long, 5¼" wide, 7¼" high. With dynamotor, R.F. meter, modulator, microphone, connecting cords. 12 or 24 volts. Your selling Price, $319.00. DEALER'S COST **$189.50**

Add $10.00 for 32 volt systems

G.L. MARINER REMOTE CONTROL RECEIVER

All that's needed to cabin in a small control box and a speaker! Tunes 200-1100 kc and 2-10 mc. Continuous vernier tuning, accuracy better than 1%. Remote choice of AVC, MVC or CW. Remote control box is only 5¼" wide, 3" high, and 3" deep. Receiver itself is 11" wide, 6 3/16" high, 18¼" long, with built-in dynamotor. Complete, including tubes, plugs, 6-conductor shielded control cable. 24 or 32 volts. Your Selling Price, $289.50. DEALER'S COST **$159.50**

Add $10.00 for 12 volt systems

G.L. MARINER RECEIVER, MARINE ONLY

This is famous Navy model ARA command receiver, 1.5 to 5 mc, pilots lots of ports in Marine band. To compliment and to our Model 50B transmitter, but may be used with any transmitter. We calibrated the dial for instant setting to frequencies you specify. Furnished to mounting rack with headphone input and leads to power the 100.1 loop if desired. Requires external speaker. With tubes and dynamotor. Marine Band: 24 or 32 volts. Dealer's Cost, $69.50. 12 volts. Your Selling Price, $99.50. DEALER'S COST **$59.50**

Low Wave Band: 24 or 32 volts. Dealer's Cost, $89.50. 12 volts (broken) Cost, $69.50.

BU-1 MANUAL DIRECTION FINDER

Goes ahead of any receiver. We convert it to marine band. Still retains lower half of broadcast band, and all of lighthouse range. Has sense antenna, phasing circuit, to 180° ambiguity. Gives true bearing in 5 seconds! We furnish automatic conversion instructions. 12, 24 or 32 volts. BRAND NEW. Your Selling Price, $79.50. DEALER'S COST **$47.50**

G.L. MARINER SPEAKER

In neat bulkhead mounting baffle, wired with transformer, cord, and plugs, to match 4-watt ohm output of G.L. MARINER receivers. Your Selling Price, $9.90. DEALER'S COST **$5.95**

BE SURE TO SPECIFY WHETHER POS. OR NEG. GROUNDED SYSTEM

For complete listing, including Model 100BA, G.L. Mariner Model 200A Automatic Direction Finder, etc., send for our catalogue.

G.L. ELECTRONICS 908 S. Vermont Ave. Los Angeles 6, Cal.
20% required on C.O.D. orders.
DEALERS: WE DO NOT ADVERTISE TO CONSUMERS.

condensers between stages. If this value is too small, the low frequency response will fall off sharply. This is due to the increase of the condenser reactance as the frequency decreases.

To preserve low frequency response, coupling condensers must be large. This is particularly true if the grid return resistor is small. Typical values of coupling condensers for broadcast equipment are .1 mfd. and .25 mfd.

4. *Screen Bypass Condensers*—The size of the screen bypass condenser influences the low frequency response. Too small values tend to decrease the low frequency response. This is largely due to a degenerative action at the low frequencies which reduces the gain at these frequencies. Values as high as 10 mfd. are not uncommon for wide response commercial amplifiers.

5. *Cathode Bypass Condensers*—Cathode bypass condensers can also cause a drop-off in low frequency response if they are too small. This is due to the same degenerative action as discussed previously. A good rule here is to keep the reactance of the bypass condenser at the lowest frequency to one-tenth of the cathode bias resistance value. Common values found in commercial equipment run from 10 to 50 mfd.

6. *Decoupling Condensers*—The isolating or decoupling condensers between stages can be a source of frequency discrimination, particularly at the lower frequencies. These should be as large as economically feasible. Typical values for low level resistance amplifier stage decoupling are 10 and 20 mfd.

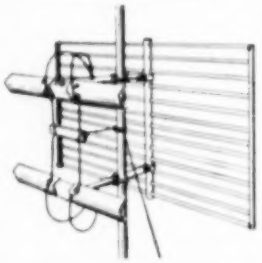
7. *Low Capacity Grid Leads*—The high frequency response may be seriously impaired by the use of grid leads having high capacity to ground. Use of ordinary shielded wire for grid cap leads, etc. should be avoided for this reason. Shielding for grid leads should consist of a small inner conductor to reduce this shunt capacitance. The smaller the inner conductor and the greater its spacing from its shield, the less the capacity will be. Commercially-made grid leads are available which have very low capacity. These are usually well worth the few cents they cost.

8. *Low Grid-to-Ground Impedance*—In input stages low grid-to-ground impedance should be maintained if transformer input is used. Low impedance values, while perhaps resulting in lower gain, prevent excessive high frequency drop-off due to shunt capacity and Miller effect. As a general rule, 60,000 ohms or less is to be preferred for extended high frequency response.

In resistance-coupled stages low values of grid return resistors can result in loss of low frequency response if the coupling condenser is of fairly low value. Typical grid return resistor values are 220,000 and 470,000 ohms and occasionally 100,000 ohms if a large coupling condenser is used.

9. *Gain Control Compensation*—Often it will be found that the response

IT'S REVOLUTIONARY
DAVIS SUPER-VISION
ALL-CHANNEL ANTENNA
FOR FRINGE AREA or DX
with ELECTRONIC DIAPOLE SEPARATORS
"THE ONLY TV ANTENNA SOLD WITH A MONEY-BACK GUARANTEE"



10 OUTSTANDING FEATURES:
1. **EXCELLENT FOR FRINGE AREA and DX RECEIVING**—and broad band receiving with high gain on all channels—2 through 13.
2. **CLEARER PICTURES UP TO 125 MILES OR MORE**—from the station.
3. **GHOST PROBLEMS REDUCED** or eliminated due to excellent pattern.
4. **PROVIDES 10 DB OR MORE GAIN ON HIGH CHANNELS** where gain is needed most.
5. **EXCELLENT FRONT TO BACK RATIO** on all channels. Eliminates co-channel interference.
6. **MINIMIZES INTERFERENCE**: Airplane Flutter—Diathermy and Ignition—F.M.—Neon Signs—X Ray—Industrial—Etc.
7. **ELIMINATES DOUBLE STACKED ARRAYS**, and out-performs 2 bay yagis on low band and 4 bay yagis on high channels.
8. **ONLY ONE TRANSMISSION LINE NECESSARY.**
9. **NO WORRY OVER POSSIBLE CHANNEL CHANGES** on either high or low channels.
10. **CAN BE TIPPED WITHOUT TILTING MAST** to take advantage of horizontal wave lengths.

AT YOUR JOBBERS, OR WRITE TO:

DAVIS ELECTRONICS T-9
3047 W. Olympic Blvd., Los Angeles 6, California
SIRS: RUSH INFORMATION TO ME AS CHECKED BELOW:
☐ Send Free Technical Data on new SUPER-VISION ANTENNA.
☐ Send Name and Address of NEAREST JOBBER.
Name _____
Street _____
City _____ State _____

A SMALL AD—BUT B-I-G MONEY!
Here's What I'll Pay for the Following:
BC-348 or BC-312 ..... up to $70.00
ATC or T-47 Type ART-13 ..... up to 250.00
BC-221 or BC-ARC-7 ..... up to 45.00
TS-323 ..... up to 100.00
FT-30 or FT-ABA-9 radio filters, each up to 6.00
Also want TS-147, TS-149, MG-149, RTA-1B or parts. Will buy anything used. I'm not kidding. Write or wire.
BOB SANETT, 4068 Dockweiler, Los Angeles, Calif.
Telephone: YOrk 4637

ON-THE SPOT **BATTERY RECORDER**
WALKIE-RECORDALL "A miniature BATTERY RECORDER-PLAYBACK.
Continuous, permanent, accurate, indexed recording at only 3¢ per hr. instantaneous, permanent playback. Take up sound up to 60 ft. Records conferences, lectures, dictation, 2-way phone & sales talks while walking, riding or flying. Records in closed briefcase with hidden mike. Write for Detailed Literature.
MILES REPRODUCER CO., INC.
812 Broadway, Dept. TN-9, New York 3, N. Y.

INTERNATIONAL ROTARY
HI-SPEED DRILLS · TAPE-SAW SAWS · DRILL-BIT REAMS



DRILL, SAW, REAM . . . metal, pipe, wood, plastic. Transite, etc. Use with any electric drill, slow drill press, lathe or milling machine. Drills own starting hole—upper part of bit is used to cut, saw or ream circles, ovals, squares or scrolls. Easy to operate. Ideal for carpenters, mechanics, electricians, plumbers, hobbyists, many others. Abrasive resistant, high speed steel. Flutes ground from solid. Will withstand severe continuous use without breaking. Resharpened at no charge. Takes place of up to $50 in tools. ½" diameter, 3" cutting sections, total length 3½". Also available specially designed for wood or metal end in 2½" and 12" lengths. Write for details. Specify all-purpose bit. Shipped same day. Money-back guarantee. Dealer inquiries invited.
SEND CASH, CHECK OR MONEY ORDER
Manufactured and distributed by:
INTERNATIONAL TWIST DRILL CORP.
618 Wyandotte, Rm. 803, Kansas City 6, Mo.
only $3.95 POSTPAID

OLSON HAS BIG, BIG BARGAINS
"LUCKY 7" HOOK-UP WIRE KIT
Stock No. AS-59
Complete Kit,
only $2.45



You get 7 coils of hook-up wire, different colors, in plastic, rubber and braided insulation. Each coil 50 feet.
Order your kit today.
SEE OLSON'S BIG ADS ON PAGES 86 & 87
OLSON RADIO WAREHOUSE
277 E. Market St., Akron 8, Ohio

Moody Kit TOOLS ARE A MUST IN RADIO, T.V. AND ELECTRONICS
Your tool box is incomplete if it lacks Moody Kit precision small tool sets. The PA-5 Kit shown contains five interchangeable Allen type and Phillips head screw drivers. Ask to see the complete Moody line at your local stores.



SEND FOR FREE DESCRIPTIVE BOOKLET
Moody MACHINE PRODUCTS CO., INC.
A Cutler Street, Providence 5, Rhode Island

PANEL METERS
2" SQUARE, WESTON—SANGAMO
0-20 Volts D.C. ..... $2.95 | 0-5 MA $2.95
0-40 volts D.C. ..... 2.95 | 0-100 MA (0-300 scale) 2.95
0-5 Amp. R.F. ..... 3.95 | 0-500 Microamp 4.95
SPECIAL PURCHASE!
Type 826 U.H.F. Triode ..... Lots of 6 ..... $3.25 per lot
Brand New Surplus. Large Quantities Available.
PORTER RADIO SALES CO.
132 Nassau St. New York, N. Y.



Be a
TELEVISION CAMERAMAN
Work with "live" equipment in studio-control room. TRAIN with Big Name TV instructors. Graduate equipped at nearby TV station. Easy payment plan. Free National Placement Service. Housing arrangements secured. Approved for Vets.
Send for FREE Booklet
TELEVISION WORKSHOP
1782 Broadway, New York 19, N. Y. Plaza 7-3721

QUALITY · SERVICE · DEPENDABILITY
DUMONT PERFECTLY CENTERED
COMPLETELY MOLDED **CAPACITORS**
Sold and Preferred Everywhere



DUMONT Electric Corp.
308 Dyckman Street, New York 34, N. Y.

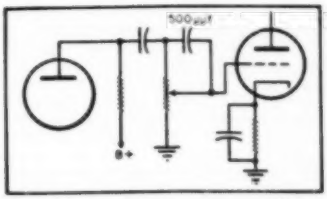


Fig. 8. Compensating condenser used to correct frequency discrimination caused by different settings of the gain control.

of an amplifier changes with the position of the gain control. At full gain setting the response will be flat but when turned to say the half-way point, the high frequency response at 10,000 or 15,000 cycles will drop off two or three db. A small condenser connected as in Fig. 8 will compensate for this frequency discrimination. An often used value is .0005 μfd. The actual value, of course, depends on the particular amplifier components.

10. *Negative Feedback* — Negative or inverse feedback may be used to straighten out the response curve and is often employed specifically for this purpose. No attempt will be made here to cover such a lengthy and comprehensive subject. One thought should be injected here at this point. Even when feedback is used, detailed attention must be paid to all the foregoing points if long time stability is to be maintained as each of the points mentioned affect the phase response as well as the frequency response.

—30—

PHOTO CREDITS

Page	Credit
31 (left)	Station WTTV, Bloomington
31 (right)	Station WHBF-TV, Rock Island
32 (top), 33 (top left), 34 (top), 50, 118	Radio Corporation of America
32 (bottom), 33 (top right)	Allen B. Du Mont Laboratories, Inc.
33 (bottom left), 34 (center)	Federal Telecommunication Laboratories, Inc.
33 (bottom right), 34 (bottom right), 42, 46	General Electric Company
34 (bottom left)	National Broadcasting Company
38	Audio & Video Products Corp.
48	U. S. Coast Guard Official Photo
49 (top left), 49 (bottom right)	G&H Wood Products Co.
49 (top center)	After Lansing Corp.
57	Standard Coil Products Company
58, 60, 61	Belmont Radio Corporation
63	The Hallicrafters Company
64	British Broadcasting Corporation
65 (center)	Triad Transformer Mfg. Co.
65 (bottom)	Gates Radio Company
119	Bell Telephone Laboratories
124	The Waldorf-Astoria
129	Far East Broadcasting Company

ERRATA

The photograph appearing on page 54 of the April issue ("Microwave Klystron Oscillators") was captioned incorrectly. The picture actually shows a Sperry 41OR klystron. A recent version of this same tube is known as the 3K30 oscillator amplifier. It operates on a wavelength of 10 cm (3000 mc. band).

• • •

In Fig. 2, page 53 of the April, 1952, issue, there should be a connection from the junction of C_5, C_6, to the top end of RFC$_1$.

In the parts list accompanying the schematic diagram, the reference to the substitution of a single .001 μfd. condenser in place of C_5, C_6, should be eliminated.

With this minor correction the Clapp oscillator circuit will operate in the correct manner.

NEWARK

NOW SERVING YOU FROM THEIR *New* ELECTRONICS HEADQUARTERS

THE MIDWEST'S *Newest, Most Complete* SHOW AND DEMONSTRATION ROOMS AT YOUR DISPOSAL

OPENING SPECIALS

Hi-Fi Sensation! Save More than Half!

PILOT MODEL AF-605 FM-AM TUNER

It's a deluxe FM-AM tuner chassis actually worth $89.95—now selling, while they last, at $42.95. Bandswitch has 4 positions: AM, FM, Phono and TV. Circuit includes 1-stage audio amplifier with flat response, ±2 db, 20 to 15,000 cps. Has negative feedback for low distortion. Separate 3-gang tuning condensers and tuned RF stages on both FM and AM. FM section has temperature compensated oscillator for minimum drift. AM section has IF wave trap for rejection of signals in the IF passband. Sensitivity: FM, 20 microvolts for .3 volt audio output with quieting; AM, 3 microvolts for .3 volt output. With: 6-6BA6, 1-6BE6, 1-6AL5, 1-6AT6, 1-6X5GT. Self-contained power supply. Has built-in FM and AM antennas, plus provision for external antennas. Chassis size, 11½x6x9". 81F903. Shpg. wt., 8½ lbs. SPECIAL 42.95

V-M 950GE TRI-O-MATIC CHANGER

Completely automatic 3-speed changer with G.E. RPX-050 "triple-play" cartridge. Will play twelve 10", ten 12" or twelve 7" records — 10" and 12" records of the same speed can be played intermixed. Combination "feeler" arm and button adjust tone arm for proper set-down. Size: 14½x12¼" — requires 5⅛" above, 2⅛" below. Requires preamplifier. Shpg. wt., 12 lbs. 73F501. NET 32.80

THE FAMOUS REGENCY MODEL DB-410 TELEVISION BOOSTER

Special Price! $14.11

Handsome mahogany plastic case, 5½x4½x3⅜". All brand new, in original cartons. With 6J6 tube. Wt., 6 lbs. 90F150 SPECIAL PRICE 14.11

FREE! NEWARK CATALOG 51

NEWARK ELECTRIC COMPANY

223 W. MADISON ST., CHICAGO 6, ILL.



NEW!

Transformer Catalog and TV Replacement Guide

Halldorson's new one-source catalog has the components you need, well classified for easy use.

This highly active line has been super-charged with 114 new items. Special attention is given to TV replacements. A self-contained guide section tells you where they are used.

Here's extra value, too. Halldorson prices actually have been reduced, but Halldorson quality is even better than ever.

Ask for a copy at your distributor, or write direct.

The HALLDORSON COMPANY
4500 N. Ravenswood Ave, Dept. N-6
Chicago, 40, ILL.

Halldorson
QUALITY *Transformers* SINCE 1913

OSCILLOSCOPES ARE "GOLD MINES"!

. . . If you learn how to use them fully on all types of service jobs!



Learn to handle the oscilloscope fully on all types of AM, FM and TV service work—and watch your efficiency and earnings soar!

MODERN OSCILLOSCOPES AND THEIR USES, a fact-jammed 328 page book by Jacob H. Rubin, Jr., of the Allen B. DuMont Laboratories contains exactly the help you need—written in a way you can clearly understand. It shows you how to use your 'scope for fast accurate work on all types of jobs from troubleshooting to realigning; how to make connections; how to adjust circuit components; how to set controls and how to analyze patterns fast and accurately. 276 helpful illustrations including dozens of pattern photos make things doubly clear.

No other type of specific service training stands to mean so much to you in terms of being able to do better, faster and more profitable work!

- ✓ When, where, why and exactly how to use oscilloscopes
- ✓ How to interpret oscilloscope patterns
- ✓ How to handle tough jobs in less time

MAIL ORDER 10-DAY FREE EXAMINATION

Dept. RN-62, RINEHART BOOKS, Inc.,
Technical Division,
232 Madison Ave., New York 16, N. Y.

Send MODERN OSCILLOSCOPES AND THEIR USES for 10-DAY EXAMINATION. If I decide to keep the book, I will then remit $6.50 plus a few cents postage in full payment. If not, I will return book postpaid and owe you nothing.

Name .....
Address .....
City, Zone, State .....
Employer's Name & Address .....
OUTSIDE U.S.A.—Price $6.50 cash only. Money back in 10 days if book is returned.



SIGNAL TRACER KIT
With Probe
Battery Operated



This terrific value in a signal tracer kit comes complete with 3 tubes, 2—1S5s, 1—3S4 and 4" speaker. Can trace a signal from antenna to speaker—locates intermittents and cuts trouble shooting time to a fraction. Comes complete with cabinet, tubes, probe, less batteries..... **10.95**

The New CASCODE TUNER
For all 630 Sets. Type 2027. For all intercarrier sets. When ordering give sound take off frequency..... **22.89** Complete with tube

STANDARD COIL TURRET TUNER TV-201.....18.95

CARTER DYNAMOTOR
Stock No. 4037 A5 Input—6 VDC Output—400 V @ 375 mils. List $71.50..... **26.95** Brand New LIST 71.50

RESISTOR KIT
100 assrtd. ½ & 1 watt Resistors. Standard brands—good assortment and good spread..... **2.99**

DUMONT TUNER
Type T3A1—Dual channel IF System 21.25 Sound Complete with knobs. Fits all 630 etc..... **19.95**

Better Than 50% Off List on Tubes—
Standard Brands. Write for our price list.

Williamson Type High-Fidelity Output Transformer



Frequency Ranges 30cy to 20KC ± ½ db. Used for Push Pull 807s or English KT66s & ohen Voice Coil. Made by Chicago Transformer Co. Terrific Value..... **4.89**

OIL-FILLED CONDENSERS
Made by Nationally Known Manufacturers
10 mfd, 600 V DC, 220 V AC
Each..... 99c
Mounting Bracket, each..... 15c



Write for Quantity Prices
TERMS: 20% cash with order, balance C.O.D. unless rated. Prices F.O.B. our warehouse in N. Y. C. Minimum order $3. NOTE: Due to conditions beyond our control, prices are subject to change.

Phone WOrth 4-3270

ACORN ELECTRONICS CORP.
76 Vesey St., Dept. N-8, New York 7, N. Y.

Speaker Recone Service — Radio Clinic
58 North Main Street **Minot, N. Dakota**
We Can Rebuild Any Speaker
24 HOUR SERVICE

2" to 5"	1.95	6"	2.04
6"	2.09	7"	2.07
8"	2.18	10"	2.30
12"	2.41	15"	3.02
15"	2.47	18"	4.50
2" x 3"	2.04	3" x 5"	2.08
4" x 6"	2.07	4" x 10"	2.31
5" x 7"	2.30	5" x 7"	2.47
6" x 9"	2.92	6" x 9"	2.97

10% Additional Discount in Lots of Five

PEN-OSCIL-LITE

Extremely convenient test oscillator for all radio servicing, alignment • Small as a pen • Self powered • Range from 700 cycles audio to over 600 megacycles u.h.f. • Output from zero to 125 v. • Low in cost • Used by Signal Corps • Write for information.

GENERAL TEST EQUIPMENT
38 Argyle **Buffalo 22, N. Y.**

Resonance Indicator

(Continued from page 45)

bles and smaller loops. Conversely, if the instrument is desired for v.h.f. use, longer cables would serve the same purpose by shifting the dead spot to a frequency lower than the lowest frequency desired for measurement. In any event, it will be found that for all frequencies other than that of the dead spot, operation is very stable. There is no meter variation as the frequency is changed and resonance is indicated by a pronounced deflection.

It is important to select a 12AU7 containing balanced sections if full advantage of the intended feature of this instrument is to be obtained. The potentiometer, R_5, is provided for the compensation of minor and unavoidable unbalancing effects. Once adjusted, it need not be touched again, except occasionally due to the aging of tubes and components. However, it must not be employed to zero the meter when there is gross unbalance from unmatched 12AU7 sections. Under such circumstances, the meter will not remain stationary as the oscillator is tuned.

Calibration of frequency may be performed by listening to the oscillator with a communications receiver with the beat-frequency oscillator turned on. Allow at least ten minutes warm-up time for both the instrument and the receiver. Disconnect the antenna from the receiver and merely move the resonance indicator within five or six feet from the receiver. The receiver frequency at which zero beat occurs is then the frequency corresponding to the particular dial setting of the resonance indicator. It should be ascertained that the receiver is not tuned to harmonic frequencies of the resonance indicator. —30—

HAM CLUB PICNIC

THE Starved Rock Radio Club will hold its annual hamfest and picnic at Camp Ki-Shau-Wau near Starved Rock State Park, Illinois on June 8th.

A diversified program has been planned for the hams, their XYL's, and the kids.

Listen on 3940 kc. for up-to-the-minute news on this annual event or contact G. E. Keith, W9QLZ, Utica, Ill.

—30—

Classified

Rate 50c per word. Minimum 10 words

RADIO ENGINEERING

COMPLETE radio, electronics theory & practice: television; broadcasting; servicing; aviation, marine, police radio. 12 or 18 months. Catalog. Valparaiso Technical Institute, Dept. N, Valparaiso, Ind.

SALE

PRESTO K-10 recorder reasonable. Kenneth Hall, 3519 Remington, Jacksonville, Fla.

HEARING aids, used. Zeniths, less accessories, $7. One-piece Nationals, $10. One-piece overhauled, with accessories, $20.00. Shelby Instrument, 321 W. 7th St., Long Beach, Calif.

TV and FM Antennas. Yagi, Conical, Bow-Tie. Mounts, accessories. Lowest prices. Wholesale Supply Co., Dept. H, Lunenburg, Mass.

RIDER'S manuals 1 thru 14 in ten volumes. Like new. $100.00. H. Huckins, 1205 W. Jefferson, Ottawa, Ill.

T23/ARC-5 Xmitter and Modulator, new, $47.00; T17/ARC-3 Xmitter, new, $15.0; BRU/2 Panadapter, new, $200. C. Stuart, 5847 2nd, Detroit 2, Mich.

FIVE element TV Yagi Beams. Aluminum tubing, etc. Write for prices. Willard Radcliff, Fostoria, O.

DIAGRAMS Radio, Record Changers, Recorders, 75c; Television with Service Data, $1.25 up. State manufacturer and model number. Kramer's Radio Service, Dept. N8, 36 Columbus Ave., New York 23, N. Y.

TUBES and equipment bought, sold, and exchanged. For action and a fair deal, write B. N. Gensler, W2LNI, 136 Liberty, N. Y. 6, N. Y.

ENJOY television with a 3 color filter screen. Thirty seconds to attach. Reduces glare, blur, and snow. Send only $1. Mention screen size. Zingo Products, Dept. B, Johnstown, N. Y.

LARGE stock of surplus electronic parts and equipment. Write us your needs. K & L Radio Parts Co., 1108 Venice Blvd., Los Angeles 6, Calif.

WANTED

WANTED: Measurements Corp. 1 Model 58 u.h.f. field strength meter with accessories. Box 523, Radio & Television News, 185 N. Wabash, Chicago 1, Ill.

BROADCAST Band Signal Generator with calibrated attenuator and a Q Meter. Box 524, Radio & Television News, 185 N. Wabash, Chicago 1, Ill.

WANTED: Jensen 18 inch Auditorium Speaker, PM or field. C. C. Bonsell, 79 Dover St., Dayton 10, O.

WANTED: AN/TRC-1 equipments, T14 transmitters, R19 receivers, TS32 test oscillators. Any condition or quantity. Box 525, Radio & Television News, 185 N. Wabash, Chicago 1, Ill.

WILL buy all ART-13/ type T-47A, $200.00, ART-13/type T-47, $150.00, BC-348 unmodified, $75.00, BC-348 modified, $55.00, APN-9, $100.00, ARC-3 complete, $250.00, R77 receivers, $400.00, ARC-1 $600.00, BC-312, $65.00, BC-342, $60.00. Ship via Express C.O.D., subject to inspection to: R. Finnegan, 49 Washington Ave., Little Ferry, N. J.

ELECTRONIC test equipment, particularly microwave radar test equipment. Highest possible prices paid for TS-174, TS-175, TS-125, TS-155, etc. Write, wire, or phone Weston Laboratories, Weston, Mass. Wellesley 5-4500.

WANTED. Top prices paid. Navy Selsyns 1F16, 1CT, 5F, 5G, 5CT and BC-348, BC-221, AN/ART-13, AN/ARC-1, AN/ARC-3, RTA-1B. Lectronic Research, 719 Arch St., Philadelphia.

AN/APR-4, other "APR-," "ARR-," "TS-," "IE-" ARC-1, ARC-3, ART-13, everything surplus; Tubes, Manuals, Laboratory equipment. Describe, price in first letter. Littell, Parhills Box 26, Dayton 9, Ohio.

INVENTIONS wanted for license to manufacturers. Patent Eng. Development Co., 624 Southern Standard Building, Houston, Texas.

MANUFACTURERS representatives to sell our custom built electronic transformers, coils, chokes and solenoids. We have good modern equipment including testing facilities plus engineering and manufacturing know-how. Dit-MCO, Inc., 729 Baltimore Ave., Kansas City 6, Mo.

HELP WANTED

RADIO service man, single man preferred. For particulars, write Zanes Radio Service, Meade, Kan.

CORRESPONDENCE COURSE

USED Correspondence Courses and Books sold and rented. Money back guarantee. Catalog free. (Courses bought.) Lee Mountain, Pisgah, Ala.

RADIO Servicing Course shows latest short cut methods. Lessons easy to follow. Only $3.00, postpaid in U.S.A. Buyers Syndicate, 30 Taylor St., Springfield, Mass.

MISCELLANEOUS

SPEAKERS repaired, wholesale prices, guaranteed workmanship. Amprite Speaker Service, 70 Vesey St., New York City 7.

24 MOST needed radio diagrams $1; 900 tube substitutions charts 50c; radio trouble shooting made easy for beginners $1; radio simplified for beginners $1; diagrams radio record changers 50c; television diagrams 75c. L. Alexander, 780 E. 211 St., New York 67, N. Y.

TERRIFIC bargains for service dealers. Send your letterhead for free gift. Peoples Radio & TV Supply, Moorman Rd., Roanoke, Va.

Two-Way Radio

(Continued from page 63)

the same frequency, can be used as a radio-telephone system. Portable and fixed units can be intermixed in any combination. They may also be tied into more powerful FM two-way radio systems such as those used by the police, fire departments, railroads, public utilities, etc. When the "Littlefone" units are used to increase the efficiency and flexibility of a higher powered fixed system and the central station antenna is approximately 200 feet above the ground, the one-watt portable unit can, in most cases, talk to the central station over distances of approximately ten miles. When this same portable low-powered equipment is used in a cruising plane at 2000 feet above the ground, the equipment will operate reliably over distances of 40 miles.

These units are comprised of a crystal-controlled, double-superheterodyne receiver and a crystal-controlled, phase-modulated FM transmitter. Two different frequency ranges are covered by these units, the first being 25 to 50 mc. (11 to 6 meters approximately), and 150 to 174 mc (2 meters approximately). The receiver sensitivities for 20 db quieting are 3/10 of a microvolt in the low frequency range and 1 microvolt or under in the high frequency range. The power outputs of the models differ depending on the power supply selected and the operating frequency. On the low band (25 to 50 mc.) the power output ranges from .75 watt with the dry battery supply to 2 watts in the high powered rechargeable wet cell models. The high frequency models vary from ½ watt output on the dry cell units to 1 watt in the high powered rechargeable storage battery models.

The central station desk or wall-mounted model employ the same compact r.f. section which is interchangeable with the hand-carried units of the same frequency range but which obtains its operating power from a transformer-rectifier system. The central station equipment also incorporates an additional one-watt audio amplifier and a self-contained loudspeaker.

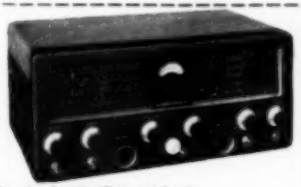
—30—



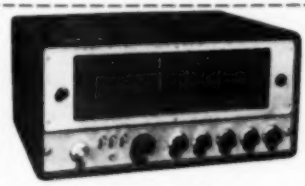
What Do You Want to Trade In on a New hallicrafters?

I have a complete stock of Hallicrafters receivers and transmitters. We will give you the best doggone trade-in in the world because we need used receivers badly for our trade. What do you have? Write me about it. I give you prompt delivery, 90-day FREE service and the world's lowest credit terms. Write, wire, phone, or visit either store today for the best deal. Export orders solicited.

Bob Henry W6ARA



Popular Double-IF Model SX-71
A double superheterodyne circuit receiver at modest cost. Built-in narrow band FM reception. Temperature compensated, voltage regulated. 5 position band selector for 538-1650 kc, 1600-4800 kc, 4.6-13.5 mc, 12.5-35 mc, 46-56 mc. 11 tubes plus voltage regulator and rectifier. Only $199.50



All-Wave Receiver Model SX-62
Covers 540 kc to 109 mc—including AM, FM, and SW broadcasts. Six bands: 540-1620 kc, 1620 kc-4.9mc, 4.9 mc-15 mc, 15-32 mc, 27-56 mc (AM-FM), 54-109 mc (AM-FM). Only $289.50. Other popular Hallicrafters models: S-76, $169.50; S-40B, $99.95; S-72, $109.95; S-72L, $119.95; S-81, $49.50; S-82, $49.50.

HENRY RADIO STORES

WORLD'S LARGEST DISTRIBUTORS OF SHORT WAVE RECEIVERS

PHOTOCON SALES

417 N. Foothill Blvd. SYcamore 2-4131
Pasadena 8, Calif. RYan 1-6751

FREE 24-PAGE SUMMER SURPLUS SALES CATALOG

WANTED new or clean used electronic surplus. Please state exact description of the condition and details of modification. Include lowest price in first letter.

Audio Oscillator Hewlett-Packard 200BR 20-20,000 c.p.s.	Exc.	$110.00
4268 Kelvin Bridge Ohmmeter, Leeds & Northrup, 0001-11 ohms	Exc.	100.00
805LX-1 Signal Generator UHF 8-180mc	Exc.	425.00
LM & BC-221 Frequency Meter with cal. book, crystal, and tubes	Exc.	99.50
Frequency Standard 1-10-100 KC, James Knight BS744	New	60.00
TS-35-AS Weston Test Set	Exc.	150.00
TS-251 UP Test Set, less crystals	New	89.50
TS-174 U Frequency Meter 20-280 mc, with cal. book, and crystal	Exc.	400.00
TS-173 UR Frequency Meter 90-450 mc.—Complete with crystal, cal. book, & 115 V.AC Power Supply	Like New	500.00
TS-146 UP X-Band Signal Generator	Like New	PUR*
TS-34 AP Portable Oscilloscope	Exc.	350.00
Industrial Circuit Tester Weston Model 785	Like New	125.00
Electronic Analyzer Weston 760	Like New	225.00
APR-4 Search Receiver		PUR*
Tuning Units for APR-4 Receiver	New & Like New	PUR*
BC-348, BC-312, BC-342 Receivers	New & Like New	PUR*
Communication Receivers—made by Hallicrafters, National, & Hammarlund. Many models	Prices start	75.50
T-47 ART-13 Transmitter		PUR*
T-17 Hand Microphone with cord and PL-68		
Measurement Corp. Standard Signal Generator Model 84 300-1000 mc	Exc.	PUR*
PU-14 Inverter Input 24 VDC, Output 115 v., 3 phase, 400 CPS, 5 Amps	Exc.	PUR*
10-23 8000 ohm	Exc.	4.50
10-23 8000 ohm	Used $2.95	New 5.95
10-18 8000 ohm	Used 1.75	New 2.25
10-32 600 ohm	Used 3.50	New 4.25
10-38 600 ohm	Used 1.75	New 2.25

*PUR—Price upon request.

NOTE: One of the largest and most complete electronic surplus stocks in the country. We have thousands of items, capacitors, props, accessories, transmitters-receivers, test equipment, etc. Send us your requirements.

TERMS: Prices F.O.B. Pasadena, California. 25% on C.O.D. orders. Tariff-rates and 3% Sales Tax. Prices subject to change without notice.

LEARN

Television-Radio Electricity

REFRIGERATION-ELECTRONICS

IN THE GREAT SHOPS OF COYNE

TRAIN QUICKLY! OLDEST, BEST EQUIPPED SCHOOL of ITS KIND in U.S.

Draft Age and Older Men . .

Come to the Great Shops of Coyne in Chicago. Get practical training in TELEVISION-RADIO or ELECTRICITY—vital in Defense Program. Prepare now for a better job or better service rating.

START NOW—PAY LATER

You can finance most of your tuition, pay for it later in easy monthly payments. Special plan for men of Draft Age. Part time employment service available.

FREE BOOK Clip coupon for Big Free Illustrated Book. Indicate below, course that interests you. No salesman will call. Act NOW.

COYNE SCHOOL

H. W. Cooke, President
A TECHNICAL TRADE INSTITUTE CHARTERED NOT FOR PROFIT
Established 1899
500 S. Paulina, Chicago

ELECTRICITY ★ TELEVISION
RADIO ★ REFRIGERATION ★ ELECTRONICS

H. W. COOKE, Pres.
COYNE School
500 S. Paulina St., Chicago 12, Ill. Dept. A2-15H

Send FREE BOOK and full details on:
☐ TELEVISION-RADIO ☐ ELECTRICITY

NAME .....

ADDRESS .....

CITY STATE

EASY MONEY!!

If you don't get our postcards telling the cash we'll pay for that surplus gear you bought when the buying was good, then YOU ARE LOSING MONEY! So send us your name and address NOW and GET ON OUR MAILING LIST!

G. L. ELECTRONICS
905 S. VERMONT AVE., LOS ANGELES 6

WANTED WANTED

Test Sets TS-12, 13, 14, 33, 35, 146, 147, 174, etc. Radio Radar Equip. ARC-1, 3, ART-13, ATC, APS-10, 15, 33, 34, TPQ-2, BC-348, 342, BC-1016 Recorders, etc.

WRITE! WIRE! CALL!

R·H·S

SPECIALS OF THE MONTH

PANEL METERS

2" SQUARE WESTON—SANGAMO

0-20 Volts D.C.	$2.95	0-5 Ma	$2.95
0-40 Volts D.C.	2.95	0-500 Microamp.	4.95
0-5 Amp R.F.	2.95		
0-100 Ma (0-300 scale)			2.95

RADAR—COMMUNICATIONS AND TEST EQUIPMENT

FLUXMETER

Portable Gauss Meter with range of 500-4000 Gauss. Used to test Magnetron and other mag. sets. Probe has a gap of 1¼". Complete. Brand New **$32.50**

TS-34/AP SYNCROSCOPE AND OSCILLOSCOPE. Used to test and service airborne and ground radars. Complete in portable carrying case with all probes, cables and accessories. Input 110v 60-2600 cyc. Excellent.

TS-16 Altimeter Test Set. Used to check various altimeters or as an accurate barometer. New **$29.95**

TS-61/AP S-band Echo Box. Using meter provided, it is possible to maximize the XMTR adjustment and determine relative power output. Complete with probe and cable. Very good condition **$140.00**

TS-13/AP Xa band signal generator, wave meter, wattmeter. Precision lab instrument. Test set will provide either pulsed or CW output in Xa band. Input 115v 60-800 cyc.

TS-228/AP used to measure peak power output of any emitter in the range of 200-1000 mcs. Has provision for oscilloscope signal observation and built in calibration. Part of AN/APM-29.

TS-69/AP freq. meter covering range of 400-1000 mcs. complete with calibration charts, antenna and cables. In metal carrying case. Excellent **$72.50**

TS-170/ARN-6 XTAL controlled test set with the following freq. ranges: 312.6, 333.8, 335.0 depending on XTAL in use. This set is used to align glide path receivers. Batteries and antenna are self contained. Excellent condition.

TS-69/AP Voltage Divider. 1:10 and 1:100 ratios. Wide band for true pulse shape. Output to scope.

TS-10/APN Altimeter Test Set. Good condition. Complete with cables and dummy antenna. **$35.00**

TS-12/AP V.S.W.R. Test Set for X-band. Complete with amplifier, slotted line, termination, adaptors, etc. In 2 carrying cases. Excellent.

TS-45/APM-3 X-band signal generator. 8400-9600 mcs. pulsed & CW output. Used to check APS4 and similar sets.

TS-36/AP X-band Power Meter. Consists of power measuring circuit. Horn antenna, co-ax to wave guide adaptor, connecting cable and probe. Will measure either absolute or relative power. Nominal band of usefulness is approx. 8.5-9.7 KMC.

TS-3/AP S-band Frequency and Power Meter. Portable. Battery operated. Complete with all cables.

TS-33/AP X-band Frequency Meter. 8500-9600 mcs. Contains crystal detector and indicating meter. Output to scope will indicate pulse wave shape.

TS-62/AP X-band Echo Box. 8460-9600 mcs. tuned and untuned input. Will indicate resonance on meter. Complete with pick up antenna and cable.

IE-19 TEST SET. V.H.F. portable equipment covering 100-156 mcs. Used to test SCR-522, ARC-1, ARC-3, etc. Complete with signal generator, field strength meter and accessories. In carrying case. Excellent.

BC-221 PRECISION FREQ. METER. Covers 150kc-20,000kc. Can be supplied with or without modulation. Portable. Complete with calibration book and crystal. Excellent.

S-BAND SIGNAL GENERATOR. Laboratory test set using 707 Klystron in McNally Cavity. Has precision attenuator and wave meter. Complete with cables. Mfg'r. Western Electric. Input 110v 60-2600 cyc. **$400.00**

OTHER TEST SETS

TS-278/AP	TS-189/U	LM
TS-102/AP	TS-110/AP	IE-30
TS-47/APH	TS-161/AR	TS-59/APN
TS-181/AP	TS-19/APQ-5	TS-23/APN
TS-268/UP	TS-98/AP	TS-18/AP
I-136	TRN-33V Thermistor Bridge	

AN/TPS-3 PORTABLE RADAR

Lightweight Portable Search Radar for detection of aircraft, in the frequency range of 600 MCS, power input 115v 400 cyc. 1350 watts, 28V DC 400W. Complete installation.

PE-104 VIBRAPACK for SCR-274. Overseas packed in original cartons with spare vibrator. Large quantity available. New.

SO-13 S-BAND MARINE RADAR

Compact Sea Search Radar for small vessels. P.P.I. indication is provided. Complete in original cases with complete sets of spares. Excellent condition.

We maintain a completely equipped reconditioning shop and development laboratory. All equipment is reconditioned and checked out to original specs. Our laboratory facilities, technical and production knowhow and thirty thousand feet of space is available for electronic subcontracts.

AN/APS-15A RADAR

High resolution X-band Navigation and Blind Bombing Radar. Can be used for high or low altitude blind bombing, precision navigation and to home on X-band ground beacons. Can also be used for ground installations. Available with or without the flux gate gyro stabilizing system. Presentation is a 5" P.P.I. a 3" A scope and a 5" remote P.P.I. Power input is 28v and 110v 400 cyc. The following units are supplied: transceiver RT-15A, indicator R-78A, antenna AS-18, control C-53, amplifier AM-19/APA-147, range unit CP-11, computer CP-10, remote P.P.I. ID-59/APS-2, junction box J-15 and J-14, all plugs and connectors. With the flux gate system AM-21 and CN-4 are supplied in addition. Weight is approx. 375 lbs. installed. Electrical characteristics are as follows: freq. X-band, power output approx. 40 KW, range 5, 10, 50 and 100 mile search and beacon. Precision ranging and bombing on 5 to 10 miles. Antenna beam width 4°. Precision expanded beacon range from 10-200 miles. Supplied from stock, reconditioned and checked out.

SCR-555 DIRECTION FINDER

Freq. range 15—65 mcs. Complete installations available including the quonset hut. Bearing indication is aural-null or left-right bearing on a meter type indicator. Power input is 12v. Weight of complete installation, approx. 2500 lbs.

AN/UPN 1 & 2 PORTABLE RADAR BEACONS

S-band beacons that can be interrogated by any S-band radar in a 45 mile range and will answer with a coded reply which can be changed as desired. The UPN-1 is battery operated. The UPN-2 is 110v 60-2600 cyc. Weight is approx. 65 lbs. complete.

APR-1 MICROWAVE RECEIVER

We can supply from stock AN/APR-1 receivers and 3 tuning units to cover the freq. range of 38-1000 mcs. These receivers are almost identical to the APR-4 equipment and the tuning units are directly interchangeable. These sets have outputs for a panadaptor and pulse analyser which can be supplied on request.

AN/TPS-1 SEARCH RADAR. This is a pack portable ground search radar for detection of aircraft up to 100 miles. Range and azimuth data is displayed on a 7" P.P.I. and a 5" "A" scope. This set was called the G.I.'s radar because of its ruggedness, dependability and ease of servicing. Complete tech data is as follows:

Range	
Max. 100 Mi.	P.R.R. 200 Per Sec.
Min. 2½	
Azimuth Mech. 360°	Pulse Width 2 Micro Sec.
Automatic 360°	
Accuracy ±3°	
Scanning Manual	Beam Width 3° Horiz.
Automatic	13° Vert.
Presentation 7" P.P.I.	
5" A Scope	
I.F.F. not provided but has provision for.	Power Input 1100 W at 115V 400 Cyc. and 180 W at 27V D.C.
Frequency 1074-1084 Mcs.	
Power output 150 K.W.	Weight: 1,518 Lbs.

AN/APS-3 Airborne X-band search and Homing radar. Complete. Cushcraft RF head, modulator, synchronizer, control boxes, plugs, antenna, etc. 115v 400 cyc.

SQ-10 CM PORTABLE RADAR. This set is a very compact search radar. Complete installation available. New in carrying cases. Tech. data as follows:

power input: 90-130v 60 cyc; pulse rate: 800 cps; pulse width: 1 microsec; light, dark range, all ranges. I.F.F. ready, output available; accuracy: power out 100 KW, beam width: 3° horiz. 15° vert.; presentation: A.S.P.P.I.

AN/ARC-1 TRANS/REC.

Provides Radio-Telephone Communication between Aircraft or Aircraft and Ground. Complete with Shock Mount and Control Box. Input: 28V DC. Excellent condition. Available in either 10 or 20 Crystal Controlled Channels 100-156 MCS, checked out.

SCR-269-G Automatic Radio Compass. Freq. range 200-1750KC. Complete with BC-453-G receiver, BC-434, LF-21, 1-81, 1-82, BB22, etc. Very good condition **$129.95**

TCS Marine Radio Telephone and Telegraph Xmitting and Receiving Equipment. Freq. range 1500-12000KC. Consists of xmitter, receiver, antenna loading coil, remote control box, power unit, cables, etc. Power input is 12 or 32v DC. We can supply an 110v AC power supply for stations at time at additional cost. Excellent condition.

SCR-536 Xmitter-Receiver (handy talkie). Freq. range 3885-5500KC. Complete with coils, tubes, crystals. Very good condition. Pair **$195.00**

AN/APA-10 Panoramic Adaptor for use with any receiver with following IF's, 455KC, 5 mcs, 30 mcs. Unit will give panoramic presentation 41 mc wide for 455KC input; ±100KC for 5MC input; ±2MC for 30 mcs input. Power input 115v 400 cyc. but can be changed with the addition of a proper power transformer. Excellent condition **$175.00**

19 Complete package, 2760 mcs. Consists of BC-1607 modulator and BC-1021 RF head. Power output approx. 40 KW. Complete with tubes **$125.00**

AN/CRT-3 Victory Model. Dust frequency energized lifeboat xmitter. Complete with xmitter, kite hydrogen generator, etc. New in knapsack. C.A.A. approved.

AN/APR-5 Radar Search Receiver. Freq. range 1000-3100 mcs. Will detect signals up to 10,000 mcs. with reduced sensitivity. Contains oscillator and mixer cavity, IF strip, power supply. Input 60-2600 cyc. 115v. Excellent condition.

T-50 Radiotelegraph Transmitter complete with power supply and all accessories with spares. Portable. Same as new. **$275.00**

AN/APT-5 500-1500 mcs. xmitter cavity oscillator using 3C22 lighthouse tube. Power output 30 watts. Noise modulated. Excellent condition. Complete with all tubes **$169.50**

SN-13W Radar Receiver Indicators. Freq. 195 mcs. 2 RF stages, 3 IF stages, 1 video, etc. New condition **$97.50**

SCR-522 VHF Airborne Command Equipment. Freq. range 100-156 mcs. in 4 channels receiver and transmitter. Crystal controlled. Complete equipment. Consists of trans/rec, control box BC-602, dynamotor PE-94, AN/APA-16 relay, etc. Power input with PE-94 is 28v. We can supply PE-98 dynamotor for 12v input at additional cost.

AN/ARR-2X RECEIVER

Secret Transmission Receiver for reception of double modulated carrier. Will receive 235-258 mcs. signals that have been modulated by a 600-750 KC signal. When carrier is heard on a standard receiver no modulation is heard on the carrier where actually speech is being transmitted. 12V DC input.

MISCELLANEOUS

Sound powered chest and headsets MI-2454-B (use 6 only, B.A. Head w/ Face ...	$ 29.95
R-87/ARR-9 receiver	99.50
AS-36/APA-1 antenna	9.50
HS-30 headsets. Good	1.95
R4-B/ARC power supply for BC-375	49.50
RA-34 power supply for BC-375	250.00
BC-1016-A beacon rec. 200-400kc 28v in, exc.	89.50
MN-26-Y compass receiver. Excellent	24.95
HS-33 headsets. Good	4.95
BC-1016-A tape recorder. Complete. New	
BC-733D receiver w/tubes	29.95
C-3 flight engineer's carrying case. Uses flashlight batteries	4.95
BC-1206-A light/receiver tube preamplifier.	435.00
AN ARC-4 2 meter trans/rec	89.95
AN APA-17 radar direction finding antenna, back to back parasitic. Freq. range 100-1000 mcs. horizontally and vertically polarized	99.00
BC-375 transmitter interphone amplifier	9.95
RL-42 meter antenna reel	6.95
BC-1-F. Xtrus using 6A8A	19.95
RD-7 APA-23 receiver for APR	135.00
AS-27 ARN-5 antenna. Excellent	4.95
ARA-500-1500 KC receiver	24.95
ID-80 APA-17 indicator. Excellent	149.95
R-28 ARC-5 100-156 mc. converter	34.95
BC-639 receiver. New	
RM-29 remote control. New	17.95
BC-453 0-9 mc receiver	11.95
BC-454 3-6 mc receiver	14.95
BC-455 amplifier receiver	19.95
BC-950 100-156 mc xmitter	49.50
RA-34-M excitor unit, Tempest, New	52.50
FL-8 filter	3.95
PL-8 plug. Less cables. Pair	1.65
3C-16-B GSAP gun camera computers with all accessories carrying case. Excel.	19.95
AT-24/APN-2 antenna. Pair	4.95

We have a large stock of TS-34/AP spares.

SEE OUR TUBE AD OPPOSITE PAGE

PHONE: DIGBY 9-0347-8-9 | **TELETYPE: NY1-771** | **CABLE: HAMSHACK NEWYORK**

WRITE FOR QUANTITY PRICES

Prices subject to change without notice. F.O.B., NYC minimum order $10.00. 20% deposit required. All merchandise guaranteed.

RADIO HAM SHACK Inc.

189 GREENWICH STREET . NEW YORK, N. Y.

JUNE 1952

INDEX OF *Advertisers*

While every precaution is taken to insure accuracy, we cannot guarantee against the possibility of an occasional change or omission in the preparation of this index.

NAME	PAGE
Acorn Electronics Corporation	144
Aires Radio Corporation	12
Allied Radio Corporation	9
Alloy Electronics	104
American Phenolic Corporation	78
American Television & Radio Company	136
Amplifier Corporation of America	141, 148
Arkay Radio Kits, Inc.	140
Arrow Sales of California	103
Ashe Radio Company, Walter	28
Astatic Corporation, The	111
Audri & Company, Theo.	149
Barry Electronics	149
Bell Telephone Laboratories, Inc.	15
Bendix Radio	129
Berlant Associates	76
Blonder-Tongue Laboratories	100
Brook Electronic, Inc.	96
Brush Development Company, The	26
Buchan, Richard J.	114
C & H Sales	132
C B C Electronics	122
Candee-Aireo	138
Candler System Company	134
Capitol Radio Engineering Institute	23
Centralab, Incorporated	10, 11
Channel Master Corporation	89
Chicago Transformer Company	91
Cleveland Institute of Radio Electronics	79
Collins Audio Products	149
Columbia Electronic Sales	141
Commercial Surplus Sales Company	134
Communication Equipment Company	93
Coyne Electrical School	145
Crescent Industries, Inc.	125
Crest Laboratories Inc.	126
Davis Electronics	142
DeCray & Associates, Frank W.	130
DeForest's Training, Inc.	4
Delco Radio Parts	14
Dow Radio, Inc.	108
Drillick Electronic Sales Company	140
Dumont Electric Corporation	142
Eastern Telephone Company	134
Editors & Engineers, Ltd.	129
Edlie Electronics, Inc.	84
Electronic Beam Corporation	77
Electronic Instrument Company, Inc.	Third cover
Electronic Specialty Supply Company	132
Electronics Institute, Inc.	114
Erie Resistor Corporation	96
Esege Sales	148
Fair Radio Sales	117
Federal Telephone & Radio Corporation	19
Federated Purchaser, Inc.	115
Feiler Engineering Company	122
Franklin Technical Institute	140
G.I. Electronics	88, 141, 145
Garrard Sales	126
General Electric Company	53
General Test Equipment	144
Gonset Company	92
Goodheart, R. E.	130
Good, Inc., Don	113
Gray, Inc., Scottie	90
Greenburg Corporation	104
Greenlee Tool Company	120
Halldorson Company	143
Hallicrafters Company, The	7
Harrison Radio Corp.	123
Harvey Radio Company, Inc.	102
Heath Company	68 thru 73, 137
Henry Radio Stores	145
High-Fidelity Magazine	141
Hytron Radio & Electronics Company	17
I. E. Manufacturing Company	93
Indiana Technical College	132
Instructograph Company	138
International Twist Drill Corporation	142
J. F. D. Manufacturing Company	8
J & H Sales Company	132
Jensen Industries, Inc.	138
Jerome-Ville Welding & Machine	104
Jersey Specialty Company	121
Jones & Laughlin Steel Corporation	95
Kay-Townes Antenna Company	137
Key Electronics Division	76
Klein Company, Manuel	20
LaPointe Plascamold Corporation	24
Leotone Radio Company	120
Littlefuse, Inc.	29
Luther, Otto	138

R·H·S
SPECIALS OF THE MONTH

Coaxial Relay K-101 SPDT—24v DCS	$ 4.95
Set of 8 UHF Coax Connectors for Above	1.98
10000 Kc Crystal HT cut	3.95
VS-2 Vacuum Switch	6.95
Sigma Plate Relay 5000 ohm SPDT	2.49
Meter 0 Coaxial Cable—75 ohm	
150' roll $11.95 300' roll	22.50
3½" Dynac Shield	1.29
15 MF @ 450 MA Choke	4.95
2 mfd 3000 V Condenser	4.29

TUBES!! BRAND NEW! STANDARD BRANDS! TUBES!!

We are clearing our tremendous tube stock at the lowest prices ever. Take advantage of this opportunity to stock up. Transmitting—Cathode Ray—Magnetrons—Photo Electric—Klystrons—Special Purpose—Receiving.

0A3 VR75	$1.04	5JP4	$24.48	807	$1.00	FG105	$17.95	2J4G	$0.67	7N7	$1.10				
0B3/VR90	1.10	5JP7	14.25	811	2.95	FG172	8.50	2J5	.88	7Q7	.65				
0C3/VR105	1.10	5JP9	12.25	811A	3.00	FG172	33.00	2J6	.88	7S7	.65				
0D3/VR150	.78	5JP11	14.95	812	2.75	FG217	49.50	2J21	.88	7T7	.65				
1B22	2.15	5JP12	49.50	813	7.75	FG237	97.00	6AALA	.88	7V7	.65				
1B24	2.15	5LP1	22.50	814	2.00	GL446A	29.95	6AB	.88	7X7	.65				
1B26	2.75	5NP1	5.50	815	2.35	GL462A	1.79	6AC	.88	7Y4	.65				
1B28	2.35	5ANP	3.75	816	1.05	HF100	6.95	6AG7	.88	7W7	.65				
1B32	1.45	5AS6	2.75	826	.98	HY114B	22.40	6AH7GT	.88	7Y4	.65				
1B35	2.45	6AS7	4.45	828	9.00	HY114B	.90	6AL5GT	1.05	7Z4	.65				
1B42	2.75	6B7	2.25	829	10.00	HY615	.90	6AM5	.88	12A	.65				
1B46	10.95	6F4	6.25	829B	12.95	HY615	.90	6AQ7GT	1.05	12A	.65				
1B48	29.75	6J4	7.95	830B	2.75	KC4	37.90	6AR6G	.88	12AG	.65				
1B62	4.75	7BP7	2.95	832	10.00	KC5	37.90	6AS5	.88	12AH	.65				
1N21 std	.75	7DP4	14.90	832A	9.49	KU610	6.95	6AS7G	.88	12AQ5	.65				
1N23	1.00	7EP7	13.75	833A	42.00	M1107	47.50	6AU5	.88	12AT7GT	1.10				
1N21B	3.35	8JP1	13.75	836A	3.40	MA8A	6.00	6AU6	1.05	12AU6	.65				
1N32	1.10	8LP1	14.95	837	3.25	RK59	1641 2.95	6AV5	1.30	12AT7	.65				
1N23	1.25	9LP1	4.98	838	3.85	RK60	1641 2.95	6AX5	1.30	12AT7	1.10				
1N23A	3.95	10BP4	17.48	841	.40	RK62	26.50	6AK6	1.05	12AU6	.75				
1N23B	3.00	10P		842	2.00	RK72	.90	6AL7	.88	12AT7	.65				
1N26	6.95	12BP7	14.75	845	6.25	RK73	.90	6AQ5	.88	12AV6	.65				
1N27	2.95	12DP7	14.75	849	27.50	RK75	2.00	6AT6	.88	12AX7	.65				
1N34A	.97	12HP7	14.75	851	37.50	RK120	12.95	6AW5	1.25	12BH6	.65				
1P21	37.50	12P4	24.25	852	37.50	RK810	6.95	6AW8	1.25	12BY7	.65				
1P23	3.95	15E	1.98	860	3.00	RT66	9.00	6AU8	1.10	12BY7GT	.65				
1P28	3.00	17BP4	69.00	861	22.50	VR75	.88	6AU6	.88	12BH6	.65				
1P29	3.00	17DP4	69.00	864		VR90	.88	6AV6	.88	12BA6	.65				
1S21	6.00	23D4	4.98	865	.98	VR105	.88	6B4G	1.25	12AT6GT	.75				
2A3/T	10.95	24A	2.98	866A	1.20	VR105A	2.98	6B7	.88	12AT6GT	.75				
2A21/RK31	.49	30 special	.49	866B	1.20	VT158	13.00	6B8G	.98	12AB5	.75				
2A3/T1617	10.95	30L1	3.49	869B	35.00	VT160	2.40	6BA6	.88	12AT7	.75				
2A29A	.98	45 special	.52	872A	2.00	VT161	2.40	6BA7	.88	12AT6GT	.75				
2A29 RK34	.98	53A	6.98	874	1.10	VX21	3.00	6BH6	.88	12BA7	.75				
2C39	32.50	57A	6.98	878	1.10	VX22	3.00	6BJ6	1.05	12BE6	.75				
2C40	8.40	100B	69.00	878A	1.98	W146B	19.98	6BG6G	1.98	12BF6	.75				
2C43	14.95	100TH	7.98	879	1.00	W146C	19.98	6BK7	1.25	12BH7	.75				
2C44	1.10	121A	2.35	881	1.30	WL531	3.00	6BJ6	1.05	12BH7GT	.88				
2C46	7.95	121B	2.35	902A	3.00	WL532	3.40	6B8G	1.25	12BH7GT	.88				
2C51	6.00	204A	69.00	903	3.25	WL536	2.40	6BQ6	.88	12BA6GT	.75				
2D21	1.10	211	6.00	905	9.00	WL619	14.00	6C4	.88	12BL6GT	.75				
2E22	5.95	212E	49.50	906	9.00	WL619	34.00	6C5	.88	12BL7GT	.75				
2E24	4.65	213A	1.15	910	3.70	WL657	27.50	6C8G	.88	12BQ7GT	.75				
2E25	4.65	215A	8.00	911	3.70	WL658	140.00	6C9	.88	12BZ7	.75				
2E30	2.15	227A SC27	4.89	927	.90			6CB6	.88	12BZ7	.75				
2J21A	6.00	227B	4.89	927	1.10	0A4G	1.15	6D6	.88	14A5	.65				
2J22	7.75	250B	9.48	930	1.20	0B2	.88	6E5	.88	14A7	.65				
2J26	24.50	250TH	21.00	931A	4.00	0Z4	.50	6F6	.88	14B6	.75				
2J27	24.50	250TL	21.00	932				6F8G	.88	14B7	.65				
2J30	37.50	262B	3.98	933	.39	1A3	.78	6F8G	.88	14B8	.65				
2J31	37.50	264A	3.98	934	.39	1A5GP	.88	6G6G	.88	14BA6	.65				
2J32	37.50	274B	2.95	935	.39	1A6T	.88	6H6	.88	14N7	.65				
2J33	37.50	275B	2.95	938	.39	1A6	.88	6H6GT	.88	14N7	.65				
2J34	37.50	298A	2.00	939	3.00	1A7GT	.88	6J4	.88	14R7	.65				
2J36	110.00	298A	3.95	991 NE16	.35	1AB5	.88	6J5GT	.88	14R7	.65				
2J38	11.95	304TH	8.95	1613	4.00	1B3GT/8016	.88	6J6	.88	21EQ80	1.50				
2J38	11.95	304TH	8.95	1613	.79	1B4P	.79	6J7	.88	21EQ7	.65				
2J39	64.50	304TL	8.95	1619	2.25	1B22	32.50	6J7GT	.88	21EQ7GT	.65				
2J40	39.50	305A	24.00	1625	.88	1B24	.88	6K6GT	.88	21EQ6	.65				
2J46	39.50	307A RK75	4.00	1626	.88	1B26T	.88	6K7	.88	21	.65				
2J48	24.50	310A	5.00	1629	2.40	1C6	.88	6L6	.88	25	.50				
2J49	24.50	310A	5.00	1630	1.40	1C7G	.88	6L6G	.78	30	.25				
2J50	24.50	323 B	23.95	1631	.79	1D5GP	.88	6L7	.88	35	.25				
2J34B	32.50	327A SC27	4.75	1636	.88	1D7G	.88	6L6G	1.50	41	.47				
2J51	97.50	328A	4.75	1638	.88	1D8GT	.88	6L6GA	1.50	42	.78				
2J61	44.50	331A	11.95	1639	.75	1E5GT	.88	6L7	.88	45	.57				
2J62	47.50	350A	4.00	1641	1.75	1E7G	.88	6L7GT	.88	45Z3	.57				
2K21		350B	1.98	1642	.73	1E7G	.88	6N7	.88	46	.65				
723AB	28.75	368AS	7.50	1651	.88	1F4	.88	6N7GT	.88	50L6	.51				
2K28	35.00	371A	1.00	1652	.88	1F5G	.88	6P7G	.88	50A5	.88				
2K29	21.75	371B	.60	1654	2.75	1F6GT	.88	6Q7	.88	50B5	.67				
2K33A	110.00	388A	1.40	1655	.88	1F7G	.88	6Q7GT	.88	50L6GT	.88				
3AP1	9.95	393A	1.95	1841 RK60	2.25	1H4GT	.88	6SA7GT	.88	50Y6	.53				
3B24 ELIC	9.00	394A	1.95	1864	2.00	1H6GT	.88	6SL7GT	.88	50A5	.88				
3B25 RK22	4.00	417A	6.75	1884	3.00	1J6	.88	6SN7GT	.88	117A	.88				
3B26	9.98	434A	27.50	1885	1.50	1L4	.67	6SQ7GT	.88	117L7GT	.88				
3B28W	7.95	446A	3.75	1891	1.50	1L6	.88	6SR7	.77	117N7	.88				
3B35	4.39	446B	3.75	1891	1.50	1LA6	.88	6SS7	.88	117P7	.88				
3B37	3.75	450TH	18.75	1892	.88	1LB6	.88	6SU7	.88	117Z3	.88				
3B38	3.75	450TL	43.50	1901	4.00	1LC5	.78	6SH7	.88	117Z6	.88				
3B39	3.75	703A/1B21	43.50	2050	1.25	1LC6	.88	6SJ7	.88	35 44	.88				
3BP1	8.98	527	12.48	2051	1.10	1LH4	.88	6SK7GT	.88		.88				
3C22	126.00	530	1.25	2070	6.95	1LN5	.88	6SN7GT	.88		.88				
3C24	15.00	707B	27.50	2071	6.95	1N5GT	.88	6SQ7GT	.88		.88				
3C24 24G	1.75	575A	13.95	5008	6.00	1LH4	.88	6SQ7	.88		.88				
3C45	1.95	703A	1.25	5009	6.00	1LN5	.88	6SR7GT	.88		.88				
3C45 C1B	2.75	703A	1.25	5010	2.00	1N5GT	.88	6SS7	.88		.88				
3C45	16.50	703A	1.25	5011	2.00	1P5GT	.88	6SU7	.88		.88				
3CP1	1.98	703A	.98	5012	30.75	1P21	.88	6SH7GTY	2.75		.88				
3CP1S1	1.98	705A	1.98	5020	.88	1R4	.88	6SJ7	.88		.88				
3DP1	4.49	705BW	15.00	5021	6.00	1R5	.88	6SK7	.88		.88				
3DP1A	6.98	706CY	18.00	6001	1.00	1S4	.88	6T8	1.25		.88				
3DP1-S2A	6.98	706CY	18.00	6002		1S5	.88	6T8A	.88		.88				
3E21A	1.00	706GY	19.50	6003	1.00	1T4	.88	6U5GT	.88		.88				
3E29	15.00	707B	49.50	6004	1.00	1T5GT	.88	6U7G	.88		.88				
3FP7	1.65	707B	4.48	6005	1.49	1U4	.88	6U8	1.25		.88				
3GP1	6.39	708A	1.45	6006		1U5	.88	6V6GT	.88		.88				
3HP7	4.98	708A Sq11	1.45	6012A	6.95	1X2	.88	6W4GT	.88		.88				
4-65A	19.95	715A	.99	6136	9.95	2A3	1.10	6W7G	.88		.88				
4-125A	29.95	715AY	4.99	6146	12.45	2A5	.88	6X4	.88		.88				
4-250A	39.95	715B	4.39	6161	6.39	2A6	.88	6X5GT	.88		.88				
4AP10	8.98	715C	4.39	6166	6.39	2A7	.88	6Y6G	.88		.88				
4B22 EL5B	30.00	723AB	32.50	CK502AX	2.40	2B7	.88	6Z4	.88		.88				
4B24 EL3C	7.00	717A	.98	CK503AX	2.95	2C21	.88	6ZY5G	.88	7AU7GT	1.35				
4B26 6CF	2.00	721A	2.45	CK504AX	2.95	2C26A	1.00	7A4/XR1	.88	7BA6	.88				
4B28 2000	8.00	722A	2.35	CK506AX	2.25	2C34	1.00	7A5	.88	7B5	.88				
4B29	8.00	723A/B	10.00	CK511AX	2.25	2C43	1.00	7A6	.88	7B6	.88				
4B32	9.00	723A B	10.00	CK512AX	2.95	2C51	1.00	7A7	.88	7B7	.88				
4C27 CV92	23.50	724B	4.75	CK517AX	7.40	3A5	.88	7AB	.88	7B8	.88				
4C35	9.98	725A	4.75	CK1005	3.35	3A5/1201	.88	7AG7	1.25	7BD7	.88				
4E27 2578	14.95	726A	18.95	CK1006	3.35	3A5/1209	.63	7B4	.88	7C5	.88				
5AP1	3.98	726B	18.95	CK1007		3B7	.88	7B5	.88	7C6	.88				
5AP4	3.48	730A	29.50	EF50	.60	3D6	.63	7B6	.88	7C7	1.10				
5BP1	8.98	801	2.95	2051		3E29	.88	7B7	.88	7CA5	.98				
5BP4	4.48	803	1.75	5517A	27.50	3GK5GT	.88	7C4	.88	7CB7	.98				
5CP1	4.48	804A	.25	5518A	69.50	3S4	.88	7C5	.88	7CE5	.98				
5CP7	14.75	805	3.98	5519A	69.50	3V4	.88	7C6	.88	7E5	.88				
5C22	65.00	805	1.75	6021	47.50	5AT4	1.32	7C7	.88	11E3	.88				
5D21	24.50	807	11.75	6057	4.00	5AU4	.88	7D5	.88	11E3 MT	1.29				
5EP7	1.98	805	3.75	6127A	4.95	5AV4G	.88	7E6	.88	11N7	1.29				
5GP1	6.98	806	24.00	6128	4.95	5AW4	.88	7F7	.88	11Z3	.88				
5JP1	24.45	807	1.59	6147	14.00	5AX4	.88	7H7	.78	11Z6	.88				
5JP2	22.50	808	2.00	FG81A	3.49	5C8GT	.65	7H7	.78	117Z6	.89				

SEE OUR EQUIPMENT AD OPPOSITE PAGE

PHONE	CABLE	TELETYPE
DIGBY 9-0347-8-9	HAMSHACK NEWYORK	NY1-771

WRITE FOR QUANTITY PRICES. Prices subject to change without notice. F.O.B. NYC, minimum order $10.00, 40% deposit required. All merchandise guaranteed.

RADIO HAM SHACK Inc.

189 GREENWICH STREET • NEW YORK, N. Y.



TAKES THE "PORTERING" OUT OF PORTABLE RECORDING

THE *Magnemite**

Battery-Operated Spring-Motor

PORTABLE TAPE RECORDER

Model 610-B

Size: 11½ x 8½ x 5½ in.

Weight, *including batteries:* 10 lbs.

Net Price: $223

Field recording can now be made with as little effort as studio or home recording. Light and compact, the tiny Magnemite is the first completely portable tape recorder! Earphone monitoring and playback facilities built in. Powered by self-contained dry flashlight batteries that last 100 operating hours. Four models are available for any speech or music recording requirement, including a model designed to NAB recording standards.

*Trade Mark Reg.

Write for complete literature, specifications and direct factory prices

AMPLIFIER CORP. of AMERICA • 398-2 Broadway • New York 13, N.Y.

Unlimited Opportunities in

RADIO ENGINEERING

DEGREE IN 27 MONTHS

Complete Radio Engineering course, including Telev., U.H.F. and F.M. Bachelor of Science Degree also in Mech., Civil, Elect., Chem., and Aero. Eng.; Bus. Admin; Acct. Extensive campus, modern buildings, well equipped labs. Low cost. Prep courses. Personalized, practical instruction. Founded 1884. Placement service. Growing shortage of engineers. Prepare now for unlimited opportunities ahead. **Enter September, January, March, June. Write for catalog.**



TRI-STATE COLLEGE

1662 College Ave. ANGOLA, INDIANA

OLSON HAS BIG, BIG BARGAINS



TELEPHONE PICKUP

Stock No. M-80

$4.50

Record or amplify both sides of a telephone conversation. No connection to telephone necessary. Just lay pick-up under any cradle type phone and connect lead to hi-impedance input of any disc, wire or tape recorder or any amplifier. Operates by induction.

See Olson's Big Ads on Pages 86 & 87

OLSON RADIO WAREHOUSE 277 E. Market St. Akron 8, Ohio

BUY FOR LESS FROM SAM'S SURPLUS

	Used	New
Command and/or Arcs—Transmitters and Receivers 3-6 MC Receiver	$7.95	17.95
6-9 I Receiver	7.95	12.95
Triple Receiver Rack		1.95
V.H.F. ARCS Transmitter or Receiver, Complete with tubes	24.95	
2-3 MC Transmitter with tubes	14.95	
4-5.3 MC Trahsmitter with tubes	6.95	7.95
5.3-7 MC Transmitter with tubes	6.95	7.95
7-9.1 MC Transmitter with tubes	10.95	$19.95
3-4 MC Transmitter with tubes	18.95	
28V Receiver Command Dynamotors	$8.97	
MODULATORS		
BC 456 with Tubes, less dyn	2.95	
MD-7 ARCS Plate Modulator	9.95	
MD-7 Modulator Dynamotor, 28V	2.95	
BC 433 Receiver with tubes	$24.95	
MN-26C Compass Receiver	24.95	$39.50
MN-26Y Compass Receiver	39.50	49.50
BC-357 Marker Beacon Rec. W.O. Tube		3.95
ARC-4 W. tubes. Good, used		$29.95
522 Trans. Receiver. W. tubes. Good, used		69.50
Modulation Transformer, BC 375, New		2.95
BC 375 Trans. 100 Watt Voice, CW, MCW, freq. range 200 kc to 12 mc, uses Plug-in Tuning Units listed complete with tubes, less Tuning Units		**$29.95**
Tuning Units for BC 375 or 191 Trans:		
TU- 7 4500- 6200 kc		$2.49
TU- 8 6200- 7700 kc		2.49
TU- 9 7700-10000		2.49
TU- 10 10000-12500		2.49
TU-26 200-500 kc	each	4.50
FT-151 Shock Mounting for BC 375 or 191		2.95
BC 306 Antenna Loading		1.95
GP-7 Navy Transmitter. 100 watt master os. Can use on any freq. from 350-9050 kc by using proper plug-in. With 1 tuning unit		$13.33



"S" METER — SAM'S SPECIAL. Illuminated face. Full scale reading of 5 ma. 2½". Black face. Reverse-set pointer. New $2.49

Vibrators—Mallory. For use on 12 V battery. New 50 97

Transformers—12V 24V 2am110V primary. $2.95

ARC-4 2 Meter Transceiver,tubes,good,used $29.95

BC-434 Control Used—$1.95 New 2.95

Code Tapes for TG-10 15 rolls. New 7.95

BC-906 Absorption Type Freq. Meter Range 150-225 mc. 0.500 DC Microm. Used $11.50

Field Phones E E 8's. Used $29.95 pr.

Relay, SP-ST. Leach 6 V or 12 V New 1.49

Dynamotors—DM-32A. Input 28V. Output 250 D.C. .06 amps. Used 1.95

PE-73 29V @ 20 amps. Output 1000V @ 350 amps. New 8.95

PE-77 14V @ 40 amps output 1000V @ 350 amps New 19.95

PE-94 or SCR-522 24V. Used—$5.95 New 14.95

PE-94 Dynamotor only 4.95

DM-34 12V @ 2.8 amps. Output 220V @ 160 amps New 9.95

SPEC. 9V @ 450V output @ 80 ma. New 8.95

SPEC. 12V @ 320V output @ 80 ma. New 4.95

SPEC. 6V @ 250V output @ 80 ma. New 8.95

SPEC. 12V @ 440V output @ 200 ma. New 15.95

ARC-1 DY-9 ARC-1 Used 14.95

14 Volt Input—425 Volt Output at 163 mils. Starting Filter and Relays in base. Like New 3.95

RG-7U Coax Cable, 97.5 ohms foot .08

Head Sets—HS-30 New $1.95

HS-23 Used- 2.49

Matching Transformer for HS-30 Used .49

Cash with order. Prices subject to change California orders please include 3½% Sales Tax. Please include approximate postage—Excess will be refunded. What Have You in Surplus? Submit

ESEGE SALES COMPANY INC. 1206 BOND STREET, at PICO LOS ANGELES 15, CALIFORNIA

NAME	PAGE
McGee Radio Company	82, 83
McGraw-Hill Book Company	114
Mallory & Company, P. R.	67, Fourth Cover
Mark Electronics	131
Mattison Television Radio Corp.	120
Midway Company	140
Miles Reproducer Company, Inc.	142
Milwaukee School of Engineering	128
Moody Machine Products Company, Inc.	142
Mosley Electronics	135
National Electronics	124
National Radio Institute	3
National Schools	21
Newark Electric Company	143
Newark Surplus Materials	128
Newcomb Audio Products	140
New England Television Corporation	130
Offenbach & Reimus Company	118
Olson Radio Warehouse	86, 87, 110, 134, 140, 142, 148
Peak Electronics Company	110
Penn Boiler & Burner Mfg. Company	99
Photocon Sales	145
Pickering and Company, Inc.	139
Platt Electronics Corp.	112
Porter Radio Sales Company	142
Precise Measurements Company	92
Premier Radio Tube Company	101
Privat-Ear Corporation	125
Progressive Electronics Company	127
Pyramid Electric Company	30
Quietrole Company	90
RCA Institutes, Inc.	25, 131
R W Electronics	121
Radcom Engineering Company	113
Radio Clinic Sales & Service	144
Radio Corporation of America	Second cover
Radio Craftsmen, Inc., The	16
Radio Ham Shack, Inc.	146, 147
Radio Parts Company	22
Rad-Tel Tube Company	135
Rauland Corporation, The	81
Ray Manufacturing Company	140
Raytheon Manufacturing Company	75
Regency, Inc.	77
Rider, Publishers Inc., John F.	97
Rinehart Books, Inc.	106, 143
Roger-Phillips Research Laboratories	109
Sams & Company, Howard W.	98, 130
Sanett, Bob	142
Sarkes-Tarzian, Inc.	105
Simpson Electric Company	133
South River Metal Products	132
Spera Electronics Laboratories	132
Sprague Products Company	18
Sprayberry Academy of Radio	13
Stan Burn Radio & Electronics	122
Star Electronic Distributors, Inc.	126
Steve-El Electronics Corp.	94
Stevens-Walden, Inc.	134
Sun Radio of Washington, D. C.	90
Superior Instruments Company, Inc.	27
TAB	150
Tallen Company, Inc.	85, 148
Television Communications Institute	119
Television Workshop	142
Teirex, Inc.	119
Terado Company, The	26
Transvision, Inc.	107, 116
Trio Manufacturing Company	6
Tri-State College	148
Tung-Sol Electric Company, Inc.	138
United Technical Laboratories	133
University Loudspeakers, Inc.	139
V & H Radio & Electronics	138
Valparaiso Technical Institute	92
Video Electronics	140
Waldom Electronics, Inc.	128
Wells Sales, Inc.	80
Western Electronics Company	131
West Region Electronics	92
Wholesale Radio Parts, Inc.	131
World Radio Laboratories, Inc.	123

WANTED WE NEED YOUR Surplus Electronic Equipment

WE PAY TOP $$$ FOR:

Radio Receivers	An Connectors
Transmitters	Clamps
ARC-1	Plugs
ARC-3	Cords
ART-13	Relays
Control Boxes	Telephone Materials
Indicators	WE BUY ANYTHING!!

WRITE, WIRE TODAY!

TELL US WHAT YOU HAVE

TALLEN COMPANY, INC.

Dept. RN, 159 Carlton Ave.

Brooklyn 5, N. Y.

TVI-Proof Transmitter

(Continued from page 37)

made on the 80-meter band. With the v.f.o. connected, filaments on, and 360 volts applied to the 6L6, the driver was tuned to resonance with the drive control set at maximum. Under these conditions it was possible to obtain a grid current of around 25 ma. on the 813. This is much higher than necessary or desirable, so the drive control was then adjusted to give a final grid-current reading of 12 ma. Then, using a sensitive wavemeter, the 813 neutralizing condenser was adjusted until there was no indication of radio frequency current in the final tank at any setting of the final tank condenser. After neutralization the final plate voltage was applied and the 813 plate circuit quickly tuned to resonance. Using a dummy load, the variable link was adjusted to give normal 813 operating plate current. With the dropping-resistor method of obtaining screen voltage it is recommended that the 813 always be operated in a loaded condition and with grid drive held to rather close limits. Previous stages may be keyed, however, as the 6Y6 will reduce the 813 screen voltage to a low level with loss of excitation.

With the transmitter delivering full power into a dummy load, and a ground connection made to the r.f. chassis, it was impossible to get any indication of radio frequency leakage from the cabinet or in any of the leads.

After connecting the rig to an antenna through a low-pass filter and an antenna coupler, checks were made with a neighboring television receiver. No disturbance was noted on any channel. A distance of about 50 feet separates the end of the author's transmitting antenna from the nearest TV antenna, which is a 4-section conical.

Under normal operating conditions, operating constants for highest efficiency were as follows: 6L6 plate voltage, 360; 6L6 plate current, 20 ma.; 813 screen voltage, 375; 813 control grid voltage, −120; 813 control grid current, 12 ma.; 813 screen current, 35 ma.; 813 cathode current, 250 ma.; 813 plate voltage, 1250.

Below the radio frequency unit are mounted two more sections of identical size which contain the speech amplifier and modulator units. The tube lineup of the speech amplifier, which utilizes low-level clipping and inverse feedback, is as follows: 6SJ7 and 6J5 voltage amplifiers, 6SN7 clipper, 6SN7 two-stage voltage amplifier, pair of 6L6's in the output stage. Power requirements are furnished by a 5Z3 rectifier, which also supplies plate voltage for the 6L6 r.f. driver stage.

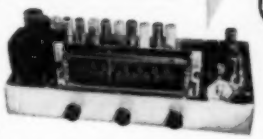
The modulator utilizes a pair of 811 tubes in class B, with about 850 volts on the plates. The power supply for the modulator stage is built on the same chassis and incorporates a pair of 816 tubes as rectifiers. —30—

THIS AD IS YOUR ORDER BLANK

OUTSTANDING HIT!

COLLINS
AM-FM "PRE-FAB" TUNERS

CLIP AND MAIL WITH YOUR ORDER



Above: Collins FM-AM Pre-Fab Tuner After You've Assembled It. Total Kit Cost, $69.

Join thousands developing a fine radio hobby with inexpensive COLLINS FM-AM Pre-Fab Tuners — best buy in radio tuners since the crystal set! Thrilling experience in economical way to high fidelity radio reception. Radio building's a snap with COLLINS wired and tested components! Buy direct from COLLINS factory and POCKET THE SAVINGS!

Collins — the only company devoted exclusively to manufacture of radio tuners and tuner kits . . . continuously producing finer kits at LOWER COST with the SAVINGS GOING DIRECTLY TO YOU!



FM Tuning Unit 88-108 MC $15.25 ☐

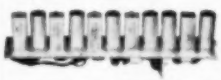


U.C-2 Universal Chassis Kit $14.75 ☐



AM Tuning Unit (Includes IF & Audio Amplifier) $19.25 ☐

Am-4 Tuning Unit (With Tuned RF Stage & 3-gang Condenser for Higher Sensitivity) $24.50 ☐



FM-IF Amplifier 10.7 MC $19.75 ☐

Tuning Eye Kit 6U5-G $2.85 ☐



All Pre-Fab units assembled, wired, tested and aligned at factory. Prices include tubes. Chassis Kit includes all necessary parts, nothing else to buy. Instruction Manual with detailed step-by-step procedure, pictures and schematic diagrams included. Chassis measures 8" x 17"-x2½". Overall, tuner assembled measured 8"x17"x6". Expertly engineered for utmost satisfaction.

COLLINS AUDIO PRODUCTS CO., Inc.
P. O. Box 368, Westfield, N. J.

Enclosed please find check ☐ money order ☐ for items checked in this ad.

Amount enclosed $ _____

Name _____

Address _____

City _____ State _____

SELENIUM RECTIFIERS FULL WAVE BRIDGE TYPES

Current (Continuous)	10 14 Volts	28 28 Volts	54 -62 Volts	130 -140 Volts
1 Amp.	.....	$ 2.10	.....	$ 8.95
3 Amps.	$ 2.20	3.80	$ 6.50	10.50
2½ Amps.	.....	.....	.....	13.00
4 Amps.	3.75	6.75	8.75	.....
5 Amps.	5.00	8.00	13.00	32.00
10 Amps.	8.75	12.00	20.00	45.00
12 Amps.	8.50	16.00	29.50	52.50
20 Amps.	13.25	24.00	36.00	90.00
24 Amps.	15.00	31.00	39.50	98.00
30 Amps.	18.50	36.00	.....	.....
36 Amps.	25.50	45.00	.....	.....

100,000 plates stocked for standard and special rectifiers and rectifier supplies.

NEW! Barry Electronics Corp. Exclusive
UNIVERSAL RECTIFIER

The new Directron Universal Selenium Rectifier for the first time permits a single stack to work as a half-wave rectifier, full-wave center-tap, or bridge rectifier merely by proper connections to the contacts. These positions are a must for labs and occasional users of Selenium Rectifiers. Full hook-up and electrical information.

6 Amps. (Up to 20 volts Input)	$ 3.75
8 Amps. (Up to 20 volts Input)	5.50
10 Amps. (Up to 20 volts Input)	12.25
12 Amps. (Up to 20 volts Input)	14.25

• New, Selenium Rectifier Transformers

PRI: 115 V, 60 cycles in | 4 Amps. ..... $ 8.75
SEC: 6, 12, 18, 24, and 30 | 12 Amps. 15.75
volts @ | 20 Amps. 19.95
• 115V PRI—30V, 50 amp secondary KVAM $29.95
• 115V PRI—6V @ 100 Amp SEC $19.95
• 115, 230 V, 50 CY. PRI. SEC.: 1.5, 30.5, 33.5 and 36.5V @ 4 AMPS Herm. sealed $7.00

TUBES

Standard R.M.A. Warranty

0A2	$1.00	6AQ5	.78	6SH7	.70	25B06	.98
0D3	1.10	6AN8	.98	6SJ7GT	.70	25L6	.83
0Z4	.60	6AT6	1.05	6SK7GT	.65	25S	.83
1B3GT	.85	6AX5	.85	6SL7GT	.70	35B5	.40
1L4	1.10	6BA6	.60	6SN7GT	.70	35C5	.40
1N21	.80	6BN6	2.95	6U4GT	.60	35L6	.40
1N21-B	2.50	6BN8	.75	6V6GT	.60	35Z5	.40
1N23	2.50	6BQ5	.60	6W4GT	.60	50C5	.50
1N23-A	2.50	6AV6	.55	6X4	.45	50L6	.50
1N34	.80	6BE6	.55	6X5GT	.60	50Y6	.50
1N34-A	.80	6BE6	.65	7A7	.60	211	.95
1N54	.80	6BG6	1.95	7B6	.60	704A,TL	6.00
1N54-A	.80	6BH6	.85	7B7	.60	807,TH	6.50
1U4	.60	6BQ6-G	1.25	7B8	.60	807	1.50
2D21	.60	6BQ7	.85	7C5	.60	807-A	1.60
2D21-A	.60	6BQ7-A	1.40	12AH7	.70	872-A	10.00
2X2	.75	6BR7	.85	12AT6	.55	1616	.50
2X2-A	.75	6BS7	.70	12AT7	.70	1619	1.40
2Z2A	3.25	6CB6	.75	12BA6	.70	1803	4.50
3A4	.75	6CD6-G	1.25	12BE6	.70	1813	3.00
3A5	.65	6CG7	.70	12BH7	.75	1814	1.40
3B4	.65	6CM7	.70	12SA7	.75	1851	2.75
3D6	.55	6CQ6	.90	12SC7	.75	1852	2.00
3D6-GT	.60	6D6	.60	12SF7	.75	5010	.75
3E5	.90	6DC7	.70	12SG7	.75	5016	1.75
3V4	.60	6DE7	.70	12SH7	.75	5036	1.75
5U4-G	.55	6E7	.98	12SK7	.75	5050	1.75
5V4-G	.55	6F6	.60	12SL7GT	.75	5051	1.75
5X4-G	.55	6F7	.70	12SN7GT	.75	5063	1.25
5Y3GT	.55	6F8G	.80	25AV5	1.25	5065	.90
6AC7	.98	6G6	.80	25AV5-M	.75	5076	.90

BARRY ELECTRONICS CORP

136 Liberty Street, N. Y. 6, N. Y. BEekman 3-2563
Terms: 25% with order, balance C.O.D.—Send a few cents for postage—All merchandise guaranteed. F.O.B. N.Y.C. Remember, you may order tubes not listed!

AUDELS TV SERVICE TELLS HOW TO SOLVE TV TROUBLES AND ANSWERS TV QUESTIONS

AUDELS TELEVISION SERVICE MANUAL covers T.V. information at your finger tips. Shows good receiver adjustment and How to Get Sharp, Clear Pictures, How to Install Aerials —Avoid Blurs, Smears, Interference and How to Test, Explains Color Systems and Methods of Conversion. IT PAYS TO KNOW! Over 380 PAGES & 225 ILLUSTRATIONS explaining operating principles of Modern Television Receivers.

Just Out!



$2 POST PAID

1001 FACTS 19 CHAPTERS

Placement of Television Receivers—Receiver Controls, Test Patterns & Adjustments—Television Interference—Interference Traps—Television Antennas & Transmission Lines—Master Antenna Systems—Antenna Installation Procedure—Television Broadcasting—Television Receiver Fundamentals—Circuit Description of Typical Receiver—Television Picture Tubes—Projection Type Receivers—Television Testing Instruments—Television Servicing—Trouble Shooting—Color Television—Television Terms.

7 DAYS FREE TRIAL
GET THIS PRACTICAL ASSISTANCE FOR YOURSELF
MAIL COUPON TODAY

AUDEL, Publishers, 49 W. 23rd St., N.Y.
Mail me (postpaid for 7 Days examination)
AUDELS TELEVISION SERVICE MANUAL Price $2
If O.K. I will mail you $2, otherwise I will return book.

Name _____
Address _____
Employed by _____ T-50



SELENIUM POWER SUPPLY

6-12 Vdc output. Unregulated Variable DC supply & approximately half-wave AC. Plastic, hard encapsulated molded case. Includes voltage or speed control for motor self-reversing switches. Specs for filter, mounting instructions. Special $10.95, 2 for $20.00

SELENIUM RECTIFIERS

We specialize in Brackets and FWB supplies for your specifications. Email with Full Wave Selen Bridge & Trans. with Approx Input, with Filter, Fuse & 115V Primary

up to 18VDC at 1½ amps	$ 2.95
up to 18VDC at 3 amps	3.95
up to 18VDC at 6 amps	5.95
up to 18VDC at 12 amps	10.95
up to 18VDC at 18 amps	14.95
up to 18VDC at 6 amps	12.95

Other voltages & specs on request.

SELENIUM RECTIFIER STACKS

18 @ 1.5 2.50 4.25 4 Volts 125ma	$14.98
21 32 36 50 Volts 18 amp 25 Volts	16.98
18 12 6 CT @ 1.2 1.8 Volts 4A	8.75
18 12 6 CT @ 1.2 1.8 Volts 12A	12.95
18 12 6 CT @ 1.2 1.8 Volts 24A	16.75

TRANSFORMERS

105-125VAC 50/60 cps Input 6.3V/3A 25.2V/1A Output	3.95
105-125VAC 50/60 cps Input 6.3V/3A 25.2V/1A Output	5.95
105-125VAC 50/60 cps Input 6.3V/3A 25.2V/1A Output	7.95
105-125VAC 50/60 cps Input 6.3V/3A 25.2V/1A Output	9.95
105-125VAC 50/60 cps Input 6.3V/3A 25.2V/1A Output	3.00
105-125VAC 50/60 cps Input 6.3V/3A 25.2V/1A Output	3.25
105-125VAC 50/60 cps Input 6.3V/3A 25.2V/1A Output	3.95
105-125VAC 50/60 cps Input 6.3V/3A 25.2V/1A Output	5.95
105-125VAC 50/60 cps Input 6.3V/3A 25.2V/1A Output	7.95
105-125VAC 50/60 cps Input 6.3V/3A 25.2V/1A Output	9.95
105-125VAC 50/60 cps Input 6.3V/3A 25.2V/1A Output	3.00
105-125VAC 50/60 cps Input 6.3V/3A 25.2V/1A Output	3.25
105-125VAC 50/60 cps Input 6.3V/3A 25.2V/1A Output	3.95
105-125VAC 50/60 cps Input 6.3V/3A 25.2V/1A Output	5.95
105-125VAC 50/60 cps Input 6.3V/3A 25.2V/1A Output	7.95
105-125VAC 50/60 cps Input 6.3V/3A 25.2V/1A Output	9.95
105-125VAC 50/60 cps Input 6.3V/3A 25.2V/1A Output	3.00
105-125VAC 50/60 cps Input 6.3V/3A 25.2V/1A Output	3.25
105-125VAC 50/60 cps Input 6.3V/3A 25.2V/1A Output	3.95
105-125VAC 50/60 cps Input 6.3V/3A 25.2V/1A Output	5.95
105-125VAC 50/60 cps Input 6.3V/3A 25.2V/1A Output	7.95
105-125VAC 50/60 cps Input 6.3V/3A 25.2V/1A Output	9.95

TABOGRAM

"WRITE FOR IT"

WE STOCK LARGE VARIETY OF COMPONENTS. TELL US YOUR NEEDS. SELL US YOUR TUBES & EQUIPMENT

"TAB"

THAT'S A BUY

DYNAMOTORS

DM27C to 28V 9.2A out 8.2V 225ma	$9.98
DM4 12V 4A out 625V 150ma	11.98
DM32A 28VDC 4A out 220V 80ma	3.50
DA1B 12V Input 500V 250ma	6.75
PE94 6 VDC/110ma 14.5 VDC 1A	8.95

SELSYNS

2J1H1 GE Selsyn Motor	2 for $6.98
2J1F5 GE Brush New 115V 400cy	2 for 9.75
115/115 Sine Diff. 115V 60cy	2 for 25.00
115/115 Sine Trans. 115V 60cy	2 for 25.00
Synchro Repeater 115V 60cy	2 for 25.00
5DG10 Synchro Diff. 115V 60cy	2 for 35.00
Size 8 Bezel for 4" & 5" G.E. Synchros	2.95
Similar Advance ASA & ASY	2 for 4.95

TAB "SUN-FLASH" LAMPS

Type	Replaces	W. Sec. Min.	Each
1A	GE PF115	100	$ 9.98
2	AMGLO 46645	100	10.98
3	GE PF411	200	10.98
4	GE PF403	200	10.98
5A	GE PF415	300	10.98
6	GE PF420	300	10.98
7	GE PF430	400	10.98
8	GE PF500	500	54.98

Power Packs, Reflector Lights and Complete Line of Accessories. Write for Data.

FILAMENT XFMRS

6.3vct 4A	6.3vct 10A	Hi-Volt Hi-Line $2.00
6.3vct 1A	$1.98	7.5v 3A 75
6VCT 3A, 6v 1A	5VCT 5A	3.95
5V 60A	$15.98	5V 115A 18.95
7.5vct 12A 115Line $10.98, 24v 6a, 4.98		
24v 1.2A $1.98, 2.5vct 10A 5Wire 3.50		

LINE FILTERS

10Amp 115vac/dc Cmdl Choke/Hi-Q	$1.29
30Amp 250vac 3000-10000Hz	3.98
50Amp 600vac 250ma Filter 5mh, also 1mh	9.98
100Amp usable 110 vac/dc GE 2 for	$1.98

BALL BEARINGS



Mfr	ID	OD	Thickness	Each
MS-R1	1/2.00	32/64	10/64	$0.98
MS-R2	1/2.00	40/64	12/64	1.00
3000MS	3/8.64	1/2.00	12/64	1.00
Sonic 303	03/64	2/8.64	12/64	1.00
3000MS	03/64	2/8.64	12/64	1.00
R12/12B	3/8.64	3/4.00	12/64	1.00

Write for Complete Listing

OIL CAPACITORS

600vwdc		1000vwdc		2000vwdc	
1	.04	1	.45	1	1.00
2	.08	2	1.00	2	1.80
3	.12	3	1.60	3	3.00
4	.16	4	2.00	4	3.60
5	.20	5	2.50	5	4.00
6	.24	6	3.00	6	4.80
8	.32	8	4.00	8	6.40
10	.40	10	5.00	10	7.20

1600vwdc		3000vwdc	
1	.80	1	1.00
2	1.60	2	2.00
3	2.40	3	3.00
4	3.20	4	4.00
5	4.00	5	5.00
6	4.80	6	6.00
8	6.40	8	8.00
10	8.00	10	10.00

HIGH CURRENT MICA CNDSRS.

CYLINDRICAL...SIMILAR TYPE G

Mfd	Volts	Amps	Mfr	Each
.25	1.5	5		$14.98
.25-.001	5	5		49.50
.01	10	5		49.50
.002	20	5		49.50
.005	20	5		45.00
.002	30	5		49.50
.005	30	5		45.00
.01	30	5		49.50
.002	50	5		49.50
.005	50	5		45.00
.01	50	5		49.50
.002	100	5		49.50
.005	100	5		45.00
.01	100	5		49.50

PHOTOFLASH CAPACITORS

2X 30 Mfd Total 72 Mfd Pre Unit	$ 5.95
30 Units 21 Mfd 1800V 18 X W See	95.00
30 Units 21 Mfd 2000V 84 X W See	7.95

Save on Replacements—Write for Details

END EQUIPMENT BUYS

ART13 Spch Amp, Sells New Tubes Inc	$12.98
RM20 Control Unit, BRAND NEW	12.98
PRC7 Plate Supply Unit, Less Tubes	9.98
I-108 Range Calibrator, Metal Case	29.98
I-108 Range Calibrator, Less Tubes	19.98
SCR595 IFF, Less Tubes, As Is	3.98
BC-348 Freq. Mtr, Less Xtal	29.95
I-122A Panel Set, 115V/60cy	149.50
BC221 Freq. Mtr, Exc. Cond.	129.00
BC-221 Freq. Mtr, Less Tubes	79.95
459 TPS3 Good, As Is Less Tubes	29.98

TV PICTURE TUBES

6 MONTHS GUARANTEE

12" ROUND	$14.98
12" ROUND	17.95
16" RECTANGULAR	20.98
16" ROUND	22.98
17" RECTANGULAR	23.88
19" RECTANGULAR	24.88
19" ROUND	28.50
20" RECTANGULAR	29.88
21" RECTANGULAR	30.45
24" RECTANGULAR	39.00



Infrared Snooperscope

Image-converter Tube. Hitherto highly-classified design 2" dia. Operates with Infrared Lamp up to 350 lines/inch resolution. Complete data & tube. Only $4.95, 2 for $9.45

STORAGE BATTERIES

30 Volt Willard Mini-BRAND. New! 5 oz. Designed Portable Equip. 90c, 4 for	$3.00
2V 20AH PLATE Wild Vibrator	2.98
6V 6AH Wild NEW BRAND!	1.98
6V 40AH Willard BRAND!	6.98

RHEOSTATS



2 ohm 500 Ohmite	$2.98
15 ohm 25 W Ward-L	2.25
100 ohm 50W Ohmite	2.25
250 ohm 25W Model H	1.98
250 ohm 25W	1.39, 4 for 5.00
300 ohm 200W Model P	5.49
350 ohm Semi-vitreted shaft 25 watt 79c, 3 for	2.00
1000 ohm 25W Model H	2.19

ALLEN BRADLEY POTENTIOMETERS

1000 ohm Type J 1½ Flatted Shaft	$1.45
25K ohm Type J 1½ Slotted Shaft	1.25
50K ohm Type J 1½ Slotted Shaft	1.25
100K ohm Type J 1½ Flatted Shaft	1.45
1 Meg Type J 1½ Slotted Shaft	1.25
1 Meg Type J2 1½ Flatted Shaft	3.69

ATTENUATORS

7470 & 1065 ohm 12 Step	$3.98
100,000 Ohm 2 Step 11dB Step	4.00
50,000 Ohm 20 Step 1½dB Step	3.98

TUBES

"TAB" TESTED & GUARANTEED

PRICES SUBJECT TO CHANGE

Use Your Priority for SPEEDY DELIVERY—Extend Your DO & Contract Nos.

Top Dollar Paid for Your Surplus Tubes—Send List and Prices

THAT'S A BUY "TAB" THAT'S A BUY

DEPT. GRN. SIX CHURCH ST. NEW YORK 6, N.Y., U.S.A. CORNER CHURCH & LIBERTY STS. ROOM 200

Money Back Guarantee
Cost of Item Only
$1 Min. Order FOB
NYC. No Shop Charges
25% Min. Value
Will fill ½ Exp. only
Prices Subject to Change Without Notice. Phone Worth 2-7230.

EICO TEST INSTRUMENTS

guard

CBS-Columbia Inc.

HIGH STANDARDS OF
TELEVISION PRODUCTION QUALITY



In the CBS-Columbia design laboratories, Al Goldberg takes some important readings with the EICO Model 221 Vacuum Tube Voltmeter and Model 555 Multimeter as Harry R. Ashley looks on



Mr. Al Goldberg, Assistant Chief Engineer of CBS-Columbia and Harry R. Ashley, President of EICO, inspecting the use of the EICO Model 221 Vacuum Tube Voltmeter and Model HVP-1 High Voltage Probe at the Sweep Frequency Troubleshooting Position on the CBS-Columbia Television production lines

KITS
WIRED INSTRUMENTS



NEW 360K MULTIMETER
KIT $24.95 WIRED $29.95



320K SIG. GEN. KIT $19.95, WIRED $29.95

NEW 322K SIG. GEN.
KIT $23.95, WIRED $34.95



NEW 950K R-C BRIDGE & R-C-L COMP. KIT $19.95
WIRED $29.95



NEW 1040K BATTERY ELIM. KIT $25.95, WIRED $34.95

For Laboratory Precision at Lowest Cost— the Leaders Look to EICO!

WHY does CBS-Columbia, Inc., today's headline-maker in Television set production, use EICO Test Instruments on its new Television production lines and in its design laboratories?

BECAUSE like Emerson, Tele-King, Teletone, and many another famous TV manufacturer coast to coast, CBS-Columbia knows that . . .

Only EICO Test Equipment delivers All 10 EICO nomical Features!

1. Laboratory Precision
2. Lowest Cost
3. Lifetime Dependability
4. Speedy Operation
5. Rugged Construction
6. Quality Components
7. Latest Engineering
8. Super-Simplified Assembly and Use Instructions
9. Laboratory-Styled Appearance
10. Exclusive EICO Make-Good Guarantee

Before You buy any higher-priced equipment, be sure You look at the *EICO* line—*in Wired as well as Kit form!* Each EICO product is jam-packed with unbelievable value. YOU be the judge—*compare, see EICO instruments today*—in stock at your local jobber—and SAVE! Write NOW for FREE, newest Catalog 6-K.

FOLLOW THE LEADERS . . . *INSIST ON EICO!*

NEW 221K VTVM KIT $25.95
WIRED $40.95



HIGH VOLTAGE PROBE $8.95



NEW 425K 5" PUSH-PULL SCOPE KIT $44.95, WIRED $79.95



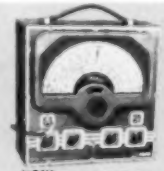
311K VOM KIT $14.95
WIRED $17.95



NEW 536K MULTIMETER KIT $12.90
WIRED $14.95



NEW 1171K RES. DECADE BOX KIT $19.95
WIRED $24.95



NEW 315K DELUXE SIG. GEN. KIT $30.95
WIRED $39.95



145K SIG. TRACER KIT $19.95
WIRED $30.95



NEW 625K TUBE TESTER KIT $34.95
WIRED $49.95

NEW CRA CB ADAPTOR FOR ABOVE $4.50



360K SWEEP GEN. KIT $34.95
WIRED $49.95

EICO

ELECTRONIC INSTRUMENT CO., Inc.
84 WITHERS STREET, BROOKLYN 11, NEW YORK

©1951, Electronic Instrument Co., Inc.

Prices 5% higher on West Coast. Due to unstable conditions, prices and specifications are subject to change without notice.



'Way Out Front with Servicemen . . . everywhere!

MALLORY VIBRATORS

Servicemen know they get dependable, trouble-free performance from Mallory vibrators. That's why a recent survey showed Mallory vibrators the choice of servicemen by a 2 to 1 margin. Count on Mallory vibrators for . . .

1—Slow contact impact for minimum wear.

2—High contact pressure for low resistance.

3—Fast contact break for reduced arcing, pitting.

Mallory *alone* gives you that three-way vibrator combination because of its patented, tuned mechanism. It's your assurance of long-lasting service that beats the comeback problem. Set makers count on Mallory, too . . . they use more Mallory vibrators as original equipment than all other brands combined. When you order vibrators . . .

Make Sure! Make it Mallory!



You get a Handy Parts Cabinet at no additional cost with Mallory's Special Vibrator Deals

You keep your inventory down . . . and get the parts cabinet, too . . . with these Mallory deals you can service 47 different makes of radios with the assortment of 6 Mallory vibrators. All this is yours at *your regular discount price*. See your distributor today.

APPROVED PRECISION PRODUCTS

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA